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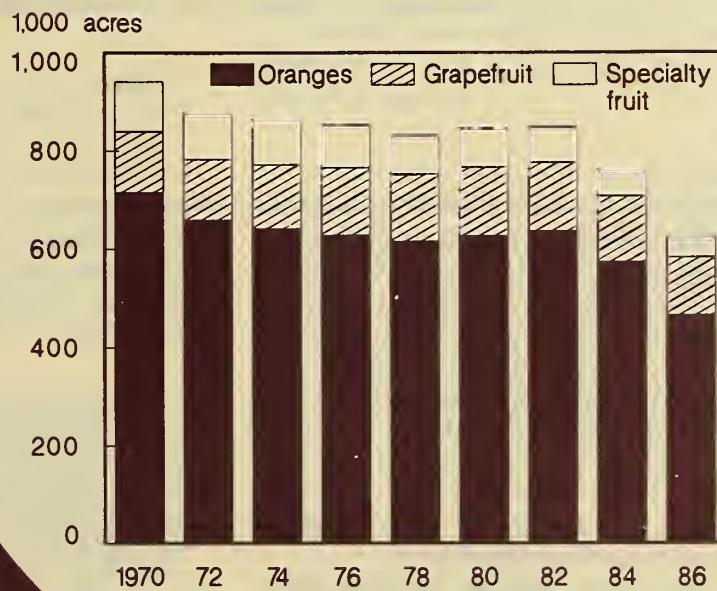
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# Fruit

## Situation and Outlook Report

Florida Commercial Citrus Acreage



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Approved by the World Agricultural Outlook Board. Summary released October 29, 1986. The next summary of the *Fruit Situation and Outlook* is scheduled for release in March 1987. Summaries and full Situation and Outlook reports, including tables, may be accessed electronically. For details, call (202) 447-5163.

The *Fruit Situation and Outlook* is published semiannually and supplemented by a yearbook. Annual subscriptions are available

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from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. For ordering and pricing information, call the GPO order desk at (202) 783-3238.

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## SUMMARY

As of October 1, 1986/87 U.S. citrus production was forecast at 12.4 million tons, 14 percent above 1985/86 despite reduced bearing acreage. (This forecast excludes California's grapefruit crop outside of the desert areas). All citrus crops are forecast higher primarily because of generally favorable growing weather.

*Total orange output for 1986/87 is forecast at 201 million boxes, 14 percent higher than last season and 27 percent above 1984/85. Orange prices at all levels have been well below a year ago. With seasonally increased supplies, fresh orange prices are expected to fall further through early winter.*

*The October 1 forecast for this season's grapefruit production (excluding California's crop outside the desert areas) is 58 million boxes, 9 percent more than last season. Crops in Florida and California are projected to be moderately larger. The Texas crop is expected to be well above last season, but the Arizona crop is likely to be considerably smaller. With the lackluster economy, demand for fresh grapefruit is likely be stable.*

*Prospects for exports of fresh grapefruit continue favorable in light of the weak dollar. Prospects for processor demand are not encouraging, because processed carryover stocks are up. Thus, the larger grapefruit crop, combined with the larger orange crop and expected weak processor demand, will probably keep grapefruit prices below last season.*

*The 1986/87 California-Arizona lemon crop (tree crop available for harvest) is expected to total 24.7 million boxes, 35 percent more than last season's small crop but still 4 percent below the 1984/85 utilized production. Crop prospects are up 26 percent for California and 75 percent for Arizona. F.o.b. prices for fresh lemons have so far averaged significantly below a year earlier. This season's larger crop should weaken prices further as the season progresses.*

*To meet domestic demand, FCOJ imports will remain relatively heavy. However, the recent ruling by the Department of Commerce on the Brazilian FCOJ exported to the United States at less than fair value in violation of the anti-dumping act may affect FCOJ imports during 1986/87. The final decision on a permanent tariff is not scheduled until January 1987.*

*After Brazilian exporters raised prices on their FCOJ, Florida packers also raised prices, from \$3.84 to \$4.08 per dozen 6-ounce cans. But volume discounts of \$.80 per case of 6-ounce cans will remain in effect through December 31, 1986. If demand stays up, FCOJ prices are likely to remain firm.*

*The 1986 noncitrus crop--including major tree fruits, grapes, and cranberries--is forecast at 11.8 million tons, down 8 percent from last year. The decrease primarily reflects a substantially reduced grape crop. The apple crop is down 3 percent from 1985. The pear crop is estimated to be 5 percent smaller, with a 9-percent decline in winter pear production. Consequently, fresh noncitrus fruit supplies will be lower this fall and winter, and prices will likely be higher than a year ago.*

*This season's pack of several canned noncitrus fruits will be down from last season. But larger carryin stocks are likely to keep supplies of most canned fruit adequate during 1986/87. Because of strong movement, several canned fruit prices have advanced. If movement continues to pick up, prices may stay firm. Supplies of frozen fruit and berries will be smaller. Strong demand, higher costs of fruit and berries, and reduced supplies point to higher wholesale prices of some frozen items.*

*Because of the smaller California grape crop and strong demand from wineries, raisin output will be smaller. However, with larger carryin stocks (including reserve pools diverted by growers), raisin supplies should be*

adequate. Demand for raisins has picked up, and this season's raisin grape prices are contracted at higher levels, so raisin prices are likely to rise. The 1986/87 supply of dried prunes will be smaller than in 1985/86, perhaps pushing up prices.

*Supplies of most tree nuts will be smaller this season. Smaller crops are estimated for all tree nuts except pistachios. Demand is expected to remain stable in light of the slow-growing economy. Smaller supplies are expected to strengthen prices.*

## GENERAL PRICE OUTLOOK

The index of grower prices for fresh and processing fruit has averaged substantially below last year so far this year. However, the September index stood at 174 (1977=100), only 3 percent below August and 4 percent lower than a year ago. Prices were lower than a year ago for grapefruit, lemons, and oranges. Overall prices are expected to fall further this fall and early winter because of seasonal

increases in supplies of apples and citrus. With larger citrus crops, the grower price index will probably remain below last year.

Retail prices of fresh fruit so far this year have averaged slightly above a year ago. The Consumer Price Index (CPI) for fresh fruit was 391.5 (1967=100) in September, declining 1.9 percent from August and standing 4.2 percent above a year ago. The decrease was primarily attributed to lower prices of apples

Table 1.--Index of annual and quarterly prices received by growers for fresh and processing fruit, 1983-86

Year	Annual	1st	2nd	3rd	4th
1977=100					
1983	128	126	127	110	151
1984	202	142	170	255	239
1985	183	184	188	178	183
1986		155	160	172	

SOURCE: Agricultural Prices, NASS, USDA.

## Prices Received by Producers

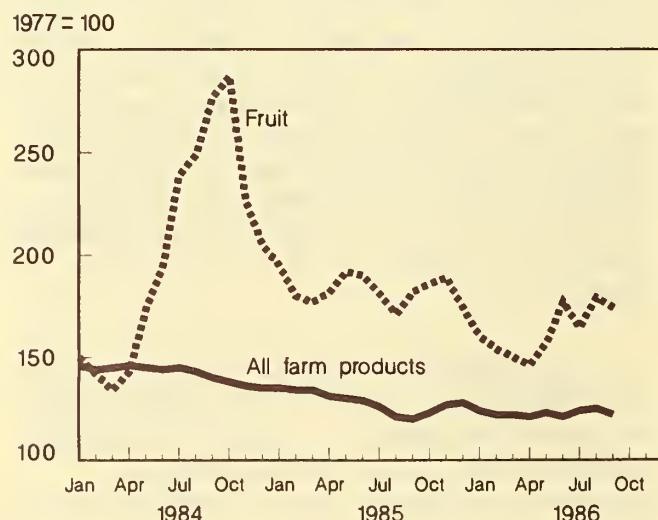


Table 2.--Annual and quarterly Consumer Price Indexes for fresh fruit, 1983-86

Year	Annual	1st	2nd	3rd	4th
1967=100					
1983	296	274	301	324	285
1984	329	295	321	355	343
1985	362	356	377	372	344
1986		352	375	386	

SOURCE: Bureau of Labor Statistics,  
U.S. Department of Labor.

## Fresh Fruit: BLS Consumer Price Index

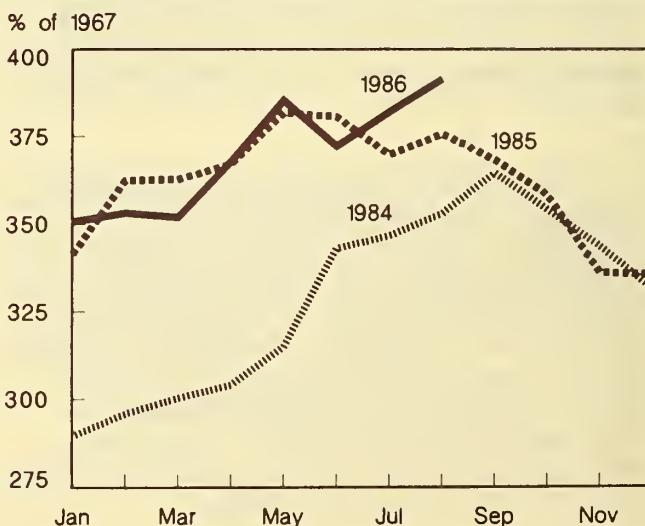


Table 3.--Annual and quarterly Producer Price Indexes for canned fruit, 1983-86

Year	Annual	1st	2nd	3rd	4th
1967=100					
1983	252	246	247	253	261
1984	270	269	269	268	272
1985	278	278	279	280	273
1986		274	275	275	

SOURCE: Bureau of Labor Statistics, U.S. Department of Labor.

and oranges. With seasonal increases in supplies of apples and citrus this fall, retail prices are expected to decline further. However, this season's overall smaller supplies of apples and winter pears, and stable demand, may hold prices relatively high.

Retail prices of processed fruit declined in September. The BLS September index of consumer prices for processed fruit fell to 161.9 (1967=100), off 0.2 percent from August but 4.5 percent below a year ago.

Several canned fruit prices have advanced because of strong movement. Rising demand and smaller supplies will probably strengthen prices of dried fruit such as prunes and raisins. Frozen fruit prices are expected to advance because of forecast strong demand and higher producer prices, particularly for strawberries. The recent Brazilian FCOJ price hike has strengthened f.o.b. prices of Florida FCOJ. If demand continues strong, orange juice prices will probably remain firm. Consequently, retail prices of processed fruit will likely rise somewhat.

### FRESH CITRUS

The first forecast of 1986/87 U.S. citrus production (excluding grapefruit in California's "other areas") is 12.4 million tons, 14 percent above 1985/86 and 20 percent above the 1984/85 crop. As of October 1, larger crops were indicated for all citrus. With the lackluster economy, demand for citrus fruit will likely be stable, and larger crops are expected to weaken grower prices.

### Oranges

#### Larger Crop Forecast

The first forecast of 1986/87 U.S. all-orange production is 201 million boxes, 14 percent higher than last season and 27 percent above 1984/85, when the crop was hit by a severe freeze. In Florida, the forecast is 129 million boxes, 8 percent more than last season's crop and 24 percent above 1984/85. Production of Florida early and mid-season varieties, at 72 million boxes, is 12 percent more than last season and 31 percent above the 1984/85 crop. Florida Valencia production is expected to total 57 million boxes, 4 percent higher than last season and 17 percent above 1984/85. However, total Florida production is not likely to reach the 1979/80 record of 207 million boxes for several years, reflecting the reduced bearing acreage.

The 1986 census of all orange acreage in Florida indicated 466,252 acres, down 19 percent from the 573,999 acres reported in 1984. Hamlin orange acreage declined by 14,139 or 11 percent, while navels showed a 652-acre increase--the only gain. Valencias showed the largest loss at 47,447 acres, down 18.6 percent from 1984. New settings in 1984 and 1985 totaled 42,876 acres, compared with 55,795 acres in 1982 and 1983. The shortage of nursery stocks after the outbreak of citrus cankers and the possibility of more freezes primarily caused the smaller new settings. The current bearing acreage for all oranges is 367,581, compared with 474,269 in 1984. The 106,688-acre loss in bearing acreage in the last 2 years is the largest in recent years because of the freezes.

California's 1986/87 all-orange forecast, at 69 million boxes, is 26 percent higher than last season and 32 percent above 1984/85. The navel crop in California is estimated at 40 million boxes, 20 percent more than 1985/86 and 53 percent above 1984/85. California's Valencia forecast, at 29 million boxes, is 35 percent higher than last season's crop and 11 percent more than 1984/85. The Arizona all-orange crop is expected to total 2.2 million boxes, 4 percent lower than last year and 10 percent below the 1984/85 crop. The Texas all-orange crop is expected to total 850,000 boxes, compared with 310,000 last season.

Table 4.--Citrus fruit: Production, 1984/85, 1985/86, and indicated 1986/87 1/

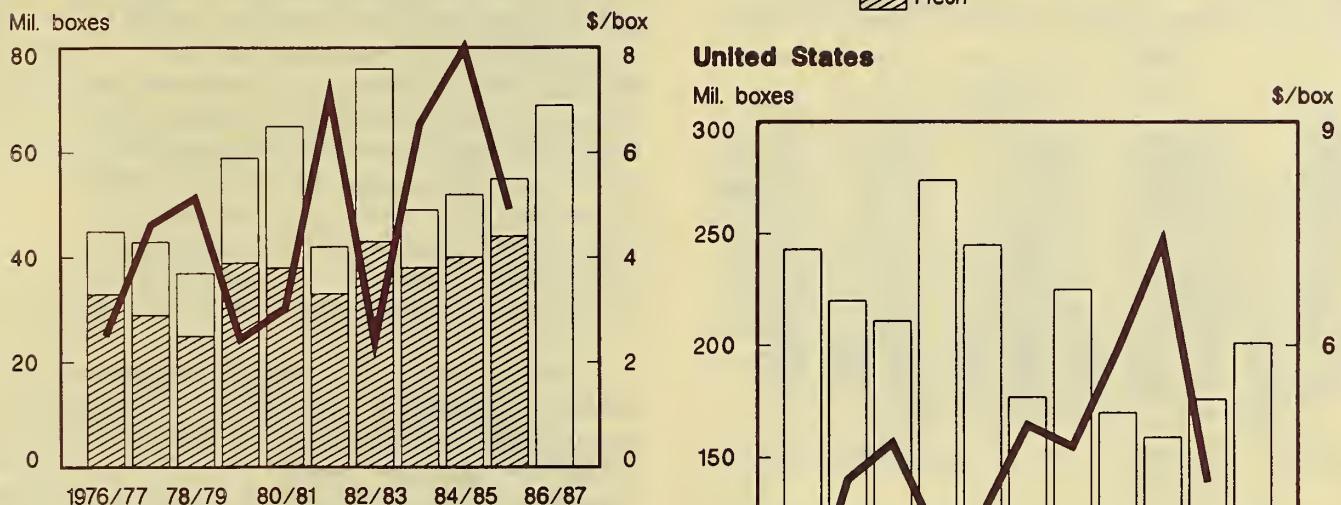
Crop and State	Boxes			Ton equivalent			
	Used		Indicated 1986/87	Used		Indicated 1986/87	
	1984/85	1985/86		1984/85	1985/86		
1,000 boxes 2/						1,000 short tons	
<b>Oranges:</b>							
Early, midseason, and Navel varieties 3/:							
California	26,200	33,300	40,000	982	1,249	1,500	
Florida	55,000	64,200	72,000	2,475	2,889	3,240	
Texas 4/	0	200	500	0	9	21	
Arizona	650	600	700	25	23	26	
Total	81,850	98,300	113,200	3,482	4,170	4,787	
<b>Valencias:</b>							
California	26,200	21,500	29,000	983	807	1,088	
Florida	48,900	54,800	57,000	2,201	2,466	2,565	
Texas 4/	0	110	350	0	5	15	
Arizona	1,800	1,700	1,500	68	64	56	
Total	76,900	78,100	87,850	3,252	3,342	3,724	
<b>All oranges:</b>							
California	52,400	54,800	69,000	1,965	2,056	2,588	
Florida	103,900	119,000	129,000	4,676	5,355	5,805	
Texas 4/	0	310	850	0	14	36	
Arizona	2,450	2,300	2,200	93	87	82	
Total oranges	158,750	176,410	201,050	6,734	7,512	8,511	
<b>Grapefruit:</b>							
Florida all	44,000	46,750	50,000	1,870	1,987	2,126	
Seedless	41,100	43,600	46,500	1,747	1,853	1,977	
Colored	16,300	18,000	19,500	693	765	829	
White	24,800	25,600	27,000	1,054	1,088	1,148	
Other	2,900	3,150	3,500	123	134	149	
Texas 4/	0	220	2,100	0	9	84	
Arizona	3,000	2,400	2,100	96	77	67	
California	8,800	8,400	--	289	276	--	
Desert Valleys	3,800	3,600	3,800	121	115	122	
Other areas	5,000	4,800	(5)	168	161	(5)	
Total grapefruit	55,800	57,770	6/ 58,000	2,255	2,349	6/ 2,399	
<b>Lemons:</b>							
California	19,800	15,100	19,000	752	574	722	
Arizona	6,000	3,250	5,700	228	123	217	
Total lemons	25,800	18,350	24,700	980	697	939	
<b>Tangelos:</b>							
Florida	3,600	2,950	4,000	162	133	180	
<b>Tangerines:</b>							
Florida	1,050	1,150	1,500	50	55	71	
Arizona	700	700	850	26	26	32	
California	1,680	1,800	1,900	63	68	71	
Total tangerines	3,430	3,650	4,250	139	149	174	
<b>Temples:</b>							
Florida	3,250	2,950	3,600	146	133	162	
Total citrus	250,630	262,080	6/ 292,000	10,416	10,973	6/ 12,365	

1/ The crop year begins with bloom of the first year shown and ends with completion of harvest the following year. 2/ Net content of box varies. Approximated averages are as follows: Oranges-California and Arizona, 75 lbs.; Florida, 90 lbs.; Texas 85 lbs.; Grapefruit-California, Desert Valleys and Arizona, 64 lbs.; other California areas, 67, lbs.; Florida, 85 lbs.; Texas, 80 lbs.; Lemons, 76 lbs.; Tangelos, 90 lbs.; Tangerines-California and Arizona, 75 lbs.; Florida, 95; and Temples 90 lbs. 3/ Navel and miscellaneous varieties in California and Arizona. Early and midseason varieties in Florida and Texas, including small quantities of tangerines in Texas. 4/ Due to the severe freeze of December 1983, no commercial supplies were harvested for the 1984-85 Texas citrus crops. 5/ The first forecast for California grapefruit "other areas" will be as of April 1, 1987. 6/ Excludes California grapefruit in "other areas".

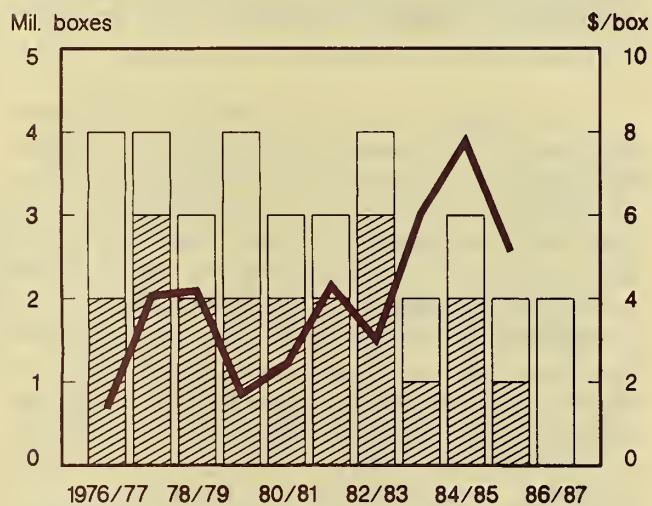
SOURCE: Crop Production, NASS, USDA.

## Oranges: Production, Utilization, and Prices

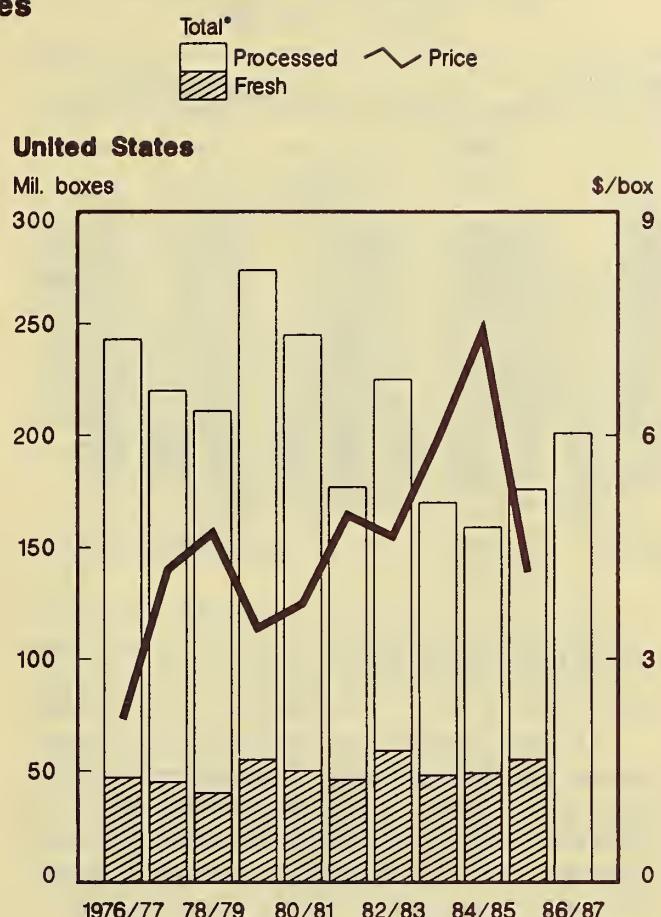
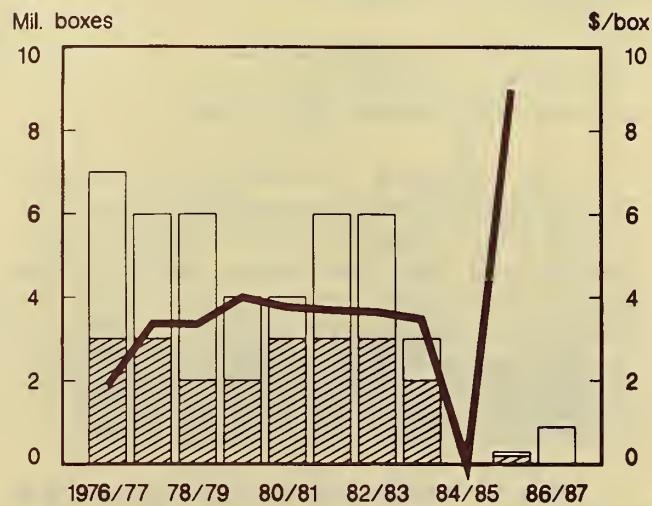
### California



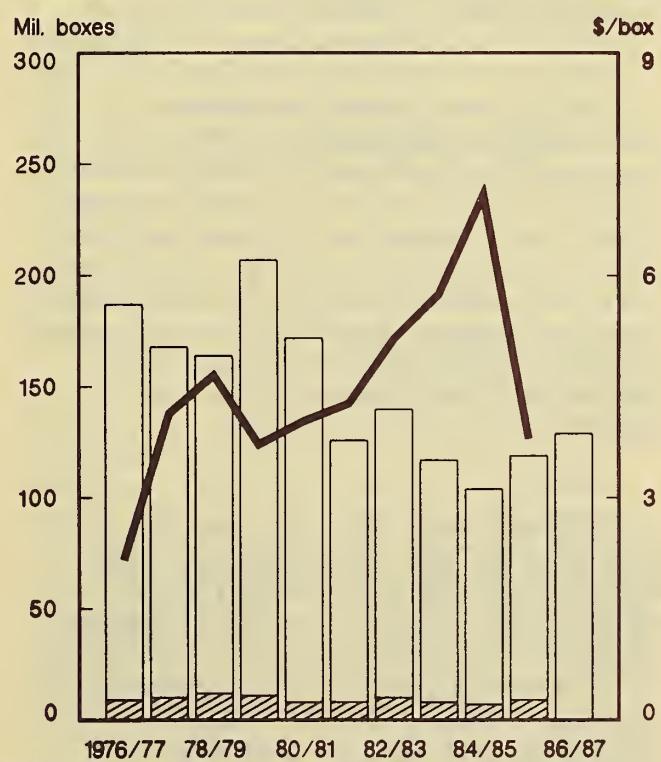
### Arizona



### Texas



### Florida



Year beginning October. \*Production having value.

Prices: on-tree returns. 1986/87 date as of October 1. Indication of total production.

Table 5.--Commercial citrus acreage,  
Florida, 1970-1986

Census years	Oranges	Grapefruit	Specialty fruit <sup>1/</sup>	Total
Acres				
1970	715,806	124,050	101,615	941,471
1972	659,418	124,142	94,459	878,019
1974	642,431	130,326	91,341	864,098
1976	628,567	137,909	85,893	852,369
1978	616,020	136,342	78,873	831,235
1980	627,174	139,944	78,165	845,283
1982	636,864	139,939	71,053	847,856
1984	573,991	134,680	52,694	761,365
1986	466,252	117,845	40,395	624,492

<sup>1/</sup> Temples, tangerines, and tangelos.

SOURCE: Florida Crop and Livestock Reporting Service.

### Lower Price Expected

On-tree returns for oranges for all sales have so far averaged significantly below a year ago. In September, on-tree returns averaged \$4.34 a box, down 25 percent from a year ago. With seasonally increased supplies, prices are expected to fall further through early winter. However, smaller crops of apples and winter pears may reduce competition and moderate declines.

U.S. grower prices for fresh and processing oranges averaged \$4.18 a box (equivalent on-tree returns) during 1985/86, compared with \$7.41 a year earlier. Lower prices were reported for all producing areas except Texas, where there was no commercial citrus crop estimate in 1984/85. The sharp decreases were attributed to greatly increased production, particularly in Florida. Larger supplies of Brazilian orange juice also contributed.

Florida orange prices dropped sharply for both fresh and processing uses. Increased supplies of Florida oranges and reduced demand from processors sharply weakened California-Arizona orange prices. The total value of orange production during the past season was estimated at \$1.1 billion (equivalent packinghouse-door returns), significantly below 1984/85's \$1.5 billion.

### Exports Down Slightly

Overseas demand for U.S. fresh oranges remained strong in the 1985/86 season, particularly in the Far East countries. Through August, exports to offshore destinations totaled 352,532 metric tons, up 2 percent from the preceding season. Hong Kong, the largest overseas market for U.S. fresh oranges, has purchased much larger quantities than a year ago. In contrast, shipments to Japan were off slightly, but prices were favorable. Shipments to the European Community have remained small.

Prospects for U.S. orange exports may improve somewhat, because U.S. orange prices are expected to fall from last season and the dollar has continued weak. In addition, the Japanese Government recently announced that its import quota for fresh oranges imported during its fiscal 1986/87 (April 1986-March 1987) is 115,000 metric tons, an increase of 10.6 percent from the previous season.

U.S. imports of fresh oranges have been up sharply this season, totaling 27,923 metric tons from November 1985 to August 1986, up 26 percent from a year ago. Combined imports from Spain and Israel rose 72 percent, accounting for 45 percent of the total. On the other hand, imports from the Dominican Republic and Jamaica decreased sharply. So far there have not been any imports from Morocco. Last season, shipments from there totaled 3,567 tons, accounting for 16 percent of the total for the first 10 months of 1984/85. Prospects for U.S. fresh orange imports may be down somewhat because of increased U.S. supplies.

### Grapefruit

#### Substantially Larger Crop Likely

The October 1 forecast for the 1986/87 U.S. grapefruit crop (excluding California's "other areas" grapefruit) is 58 million boxes, 9 percent more than last season and 14 percent above the 1984/85 utilized crop. The California "other areas" production, which will be forecast as of April 1, 1987, accounted for 4.8 million boxes last season and 5.0 million in 1984/85.

Florida's total grapefruit forecast, 50.0 million boxes, is 7 percent above 1985/86 and

14 percent above the 1984/85 utilized crop. Prospective production in California's desert areas, at 3.8 million boxes, will be 6 percent above the previous season and unchanged from 1984/85. In contrast, Arizona growers expect to harvest 2.1 million boxes, down 12 percent from last season and 30 percent below 1984/85 utilized production. The Texas crop is forecast at 2.1 million boxes, compared with 220,000 last season.

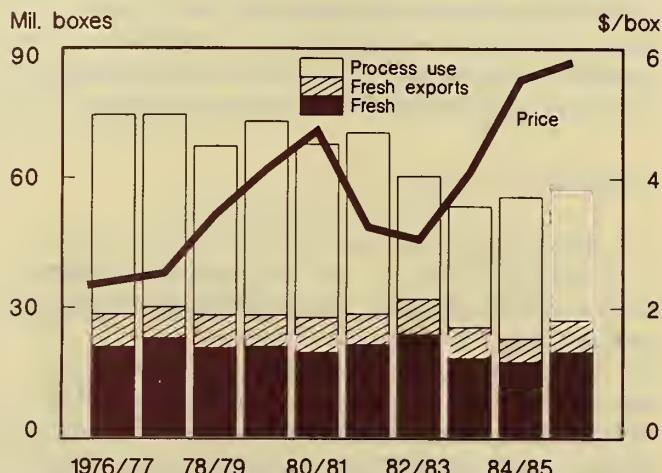
The increase in Florida production is entirely attributable to rising yields, because the 1986 bearing area decreased 14,496 acres from 1984. The 1986 Florida citrus census also shows a total of 117,845 acres, compared with 134,680 in 1984. This is the largest drop since the beginning of the biennial series. Most of the reduction occurred in the State's interior region as a result of killing freezes. The 1984 and 1985 plantings, at 4,859 acres, are down considerably from the previous 2-year period, when new plantings were 7,852 acres.

#### *Lower Prices Likely*

U.S. grapefruit prices received by growers for the 1985/86 season averaged moderately above a year ago, despite a larger crop. On-tree returns for all grapefruit, \$4.21, were 5 percent above 1984/85, as higher prices for processing use more than offset lower prices for fresh sales.

Opening prices for fresh grapefruit were strong, but prices are expected to fall with

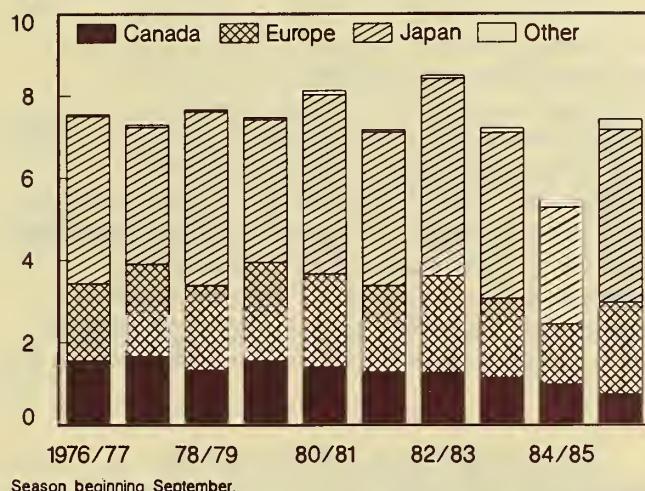
#### **U.S. Grapefruit Production, Use, and Prices**



Price: season-average packing house-door returns.  
Season beginning September.

#### **U.S. Exports of Fresh Grapefruit**

Mil. boxes



Season beginning September.

increased shipments. Carryover stocks of most processed grapefruit products are up going into the 1986/87 season, so processor demand is not expected to be as strong as the preceding season. In addition, with the lackluster economy, demand for fresh grapefruit will likely be steady. Thus, grapefruit prices may fall below last season. The larger orange crop could also depress grapefruit prices.

Retail prices of fresh grapefruit have averaged 49.3 cents per pound for the first 9 months of 1986, up moderately from a year ago. As supplies increase seasonally this fall and winter, prices will decline, and they are expected to be below last season's through mid-winter.

#### *Export Prospects Favorable*

U.S. exports of fresh grapefruit increased sharply during 1985/86, totaling 269,592 metric tons, compared with 198,843 during the preceding season. Japan, the leading U.S. customer, boosted its purchases 48 percent from a year ago. Consequently, shipments to the East Asia and Pacific region accounted for 60 percent of total exports, compared with 54 percent in 1984/85. A significant increase in shipments to the EC was also recorded, with France—the leading EC customer—taking 39 percent more than the previous year. Increased supplies, lower prices, and the weak dollar are likely to improve exports further.

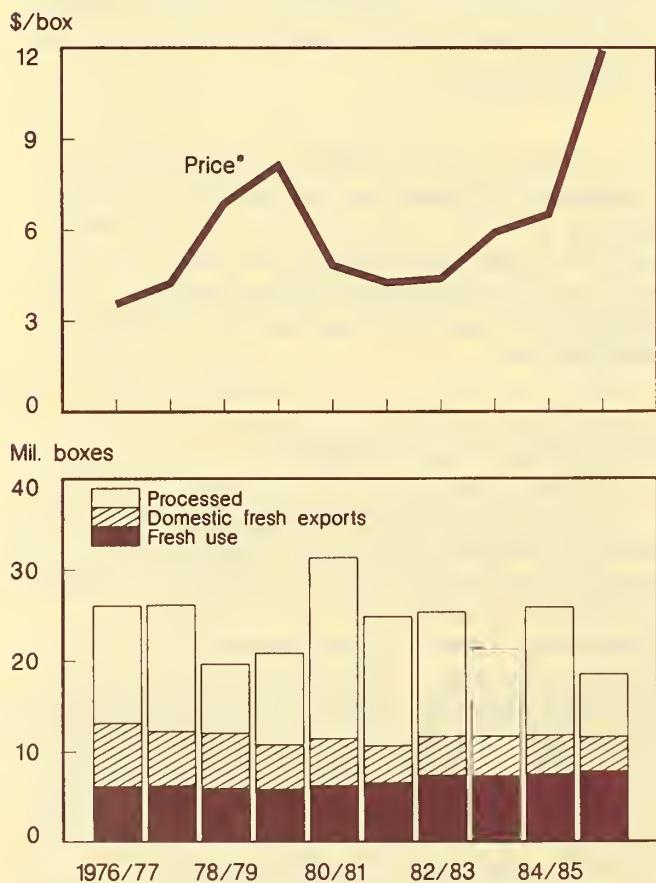
## Lemons

### Crop Significantly Larger

The Arizona-California lemon crop (tree crop available for harvest) for 1986/87 is expected to total 24.7 million boxes, 35 percent more than last season's small crop but still 4 percent below 1984/85 utilized production. The California crop, estimated at 19 million boxes, is 26 percent higher than last season but 4 percent below 1984/85. In Arizona, a tree crop of 5.7 million boxes is expected, 75 percent higher than last season but 5 percent lower than utilized production in 1984/85.

Because of the larger crop, total movement through mid-October was well above last year's pace. Deliveries to the fresh market were 37 percent above the year before, with the domestic market up 36 percent and exports up 41 percent, while shipments to processors showed a 179-percent

### U.S. Lemon Production, Use, and Price



\* Price: season-average packinghouse-door returns  
Year beginning August.

increase. In response to increased shipments, f.o.b. prices for fresh lemons have averaged \$7.73 a carton for this season through October 11, compared with \$21.90 a year ago. F.o.b. prices are expected to remain below last year through the winter.

Because of a sharply smaller crop, 1985/86 on-tree returns for lemons averaged \$9.21 a box, compared with \$3.76 the previous season. The increase was due entirely to strong prices for the fresh market, while larger stocks of processed products weakened prices for processing use. The 1986/87 on-tree returns are expected to average below 1985/86.

## Other Citrus Fruit

### Sharply Larger Tangelo Crop

The Florida tangelo crop, excluding K-early citrus, is forecast at 4 million boxes, 36 percent above last season and 11 percent more than 1984/85. The increase is entirely due to rising yields, because the 1986 census shows 9,862 acres, compared with 12,676 in 1984. However, 1984 and 1985 new plantings, at 175 acres, are up moderately from 1982 and 1983.

More of the tangelo crop goes to processing outlets than to the fresh market. During the 1985/86 season, 55 percent of the crop was processed. Larger supplies of oranges weakened the demand for tangelos, and consequently grower prices fell well below the previous season. The average grower price (equivalent on-tree returns) for all sales was \$4.02 a box, compared with \$7.08 in 1984/85. Lower prices were recorded for both fresh market and processing outlets. Prices are expected to remain weak this season because of larger production for all Florida citrus.

### Tangerine Crop Up

The U.S. tangerine crop is forecast at 4.25 million boxes, 16 percent more than last season and 24 percent above 1984/85 utilized production. The Florida forecast, at 1.5 million boxes, is for that portion of the crop expected to reach a size of 210 fruit per 4/5 bushel carton by December 1 for the Dancy variety, and November 1 for Robinson. The Dancy tangerine forecast is 1 million boxes,

while that for Robinson is 500,000. Because of the freezes, tangerine acreage decreased sharply from 1984 to 1986, according to the 1986 citrus census. Florida tangerine acreage totaled only 10,042 in 1986, compared with 14,332 in 1984.

The California tangerine forecast, at 1.9 million boxes, is 6 percent above last season and 13 percent above 1984/85. The Arizona crop is forecast at 850,000 boxes, up 21 percent from both the 1985/86 and 1984/85 crops.

Last season, 69 percent of the tangerine crop was shipped to the fresh market, the same as the previous season. U.S. grower returns (equivalent on-tree returns) for all sales averaged \$10.45, down 11 percent from 1984/85, with lower prices in all producing areas. The lower returns were due primarily to sharply reduced prices for processing use. With the larger crop, this season's prices are expected to fall.

#### *Temple Production Prospects Good*

Florida's Temple forecast is 3.6 million boxes, up 22 percent from last season and 11 percent higher than 1984/85. Higher yields account for the increase, as acreage has continued its decline. A total of 10,251 acres was reported in 1986, compared with 13,826 in 1984. Because of the larger Florida orange crop, a much smaller portion of the 1985/86 crop was processed--69 percent, compared with 81 percent in 1984/85. The freeze damage in 1984/85 also caused a larger portion for processing use. Reduced demand lowered the season-average return for all sales to \$2.92 a box (equivalent on-tree returns), down from \$5.59 the previous season. Prices declined for both fresh and processing outlets. With the larger crop, grower prices are expected to fall again.

#### **PROCESSED CITRUS**

##### *Use Up for Both Fresh and Processing*

Because of the substantially larger Florida citrus crop, 7.1 million short tons of U.S. citrus fruit were used for processing in 1985/86, up 2 percent from 1984/85. However, the proportion was down, from 67

Table 6.--Oranges and grapefruit processed, Florida, 1983/84-1985/86

Crop and season	Frozen concentrates	Chilled juice	Other processed 1/	Total processed
1,000 boxes				
<b>Oranges 2/:</b>				
1983/84	94,547	16,981	2,909	114,437
1984/85	86,112	14,903	1,907	102,922
1985/86	96,061	N.A.	N.A.	114,566
<b>Grapefruit:</b>				
1983/84	18,728	1,320	4,191	24,239
1984/85	22,996	1,065	4,951	29,012
1985/86	21,572	1,189	4,369	27,130

1/ Includes cannery juice, blends, sections, and salads.

2/ Includes tangelos, Temples, tangerines, and K-early citrus.

N.A.= data not available from industry sources.

SOURCE: Citrus Fruits, NASS, USDA.

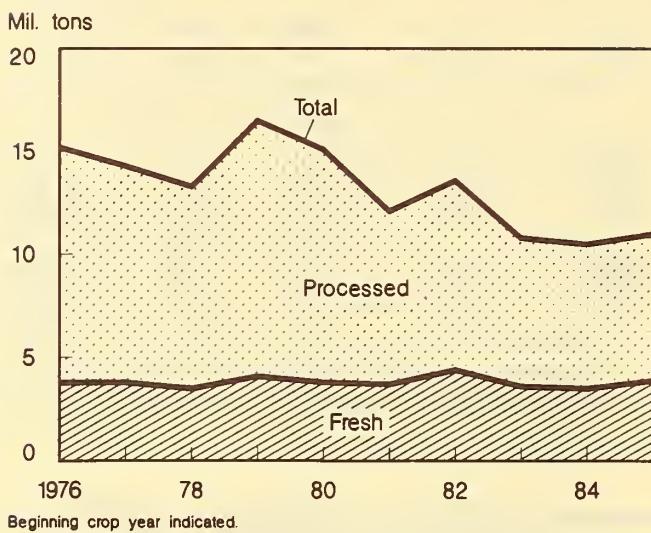
percent in 1984/85 to 65 percent in 1985/86, with reduced processing use for all citrus except oranges and Temples. Slightly less than three-quarters of the oranges were processed, along with 54 percent of the grapefruit and 37 percent of the lemons.

The larger Florida orange crop caused processing use to rise significantly, but the portion of oranges used for processing, at 92.5 percent, was down slightly from 1984/85. Many oranges were salvaged for processing use in 1984/85 because of the freeze. Although the quantity of Florida oranges--including tangelos, Temples, tangerines, and K-early citrus--used for FCOJ increased 12 percent from 1984/85, FCOJ still accounted for 84 percent of the oranges used for processing, almost the same as 1984/85.

Because of the small supply of grapefruit from Texas and the larger overall crop, a much larger quantity of Florida grapefruit was marketed fresh in 1985/86. In addition, the freeze damage also resulted in a substantial decrease in fresh grapefruit sales in 1984/85, despite a somewhat larger crop. Consequently, the percentage of the grapefruit sold fresh increased from 34 percent of the total in 1984/85 to 42 percent in 1985/86.

A moderately larger crop, the increased available supply of orange juice from Florida, and a low supply of Texas oranges resulted in a substantially larger quantity of California oranges being sold fresh. Fresh sales accounted for 80 percent of the California crop in 1985/86, compared with 77 percent in 1984/85.

## Citrus Fruit Production and Utilization



With the smaller grapefruit crop, the quantities of California-Arizona grapefruit for fresh and processing use declined from a year ago. However, a slightly larger share was sold for processing use. In contrast, a much lower quantity of California-Arizona lemons was reported for processing use. A smaller crop and larger stocks of processed products contributed to the reduced utilization of lemons. Consequently, the fresh market accounted for 63 percent of the U.S. lemon crop, compared with 46 percent in 1984/85.

### *Diminished Carryover of FCOJ Expected*

Florida's 1985/86 production of FCOJ totaled 132 million gallons, up 12 percent from 1984/85 because of a larger crop. Processors recovered 1.38 gallons of FCOJ per box at 42.0 degrees Brix, unchanged from last season. Imports of FCOJ into Florida and the United States as a whole have been considerably below a year ago. According to the Florida Citrus Processor Association, imports into the State (mostly from Brazil) totaled 60 million gallons (42 degrees Brix) through mid-October, down 11 percent from a year ago. Even with the reduced carryin stocks, the 1985/86 supply of FCOJ is likely to be near last season, assuming imports into Florida rise during the balance of the season.

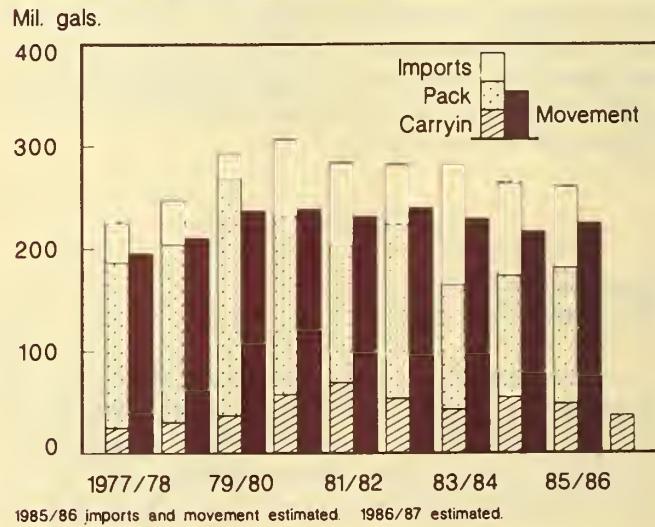
Reflecting lower prices, movement of FCOJ has been strong, reaching 194 million gallons through mid-October, up 5 percent from a year ago. After Brazilian processors

raised prices on their FCOJ, Florida packers raised FCOJ prices from \$3.84 to \$4.08 per dozen 6-ounce cans (unadvertised brand, f.o.b. Florida canneries), compared with \$4.60 a year ago. But volume discounts of \$0.80 per case of 6-ounce cans will remain in effect through December 31, 1986. Stocks as of mid-October were 23 percent below a year ago. It appears that carryover could approach 35 to 40 million gallons, compared with 48 million last season. If demand stays up, FCOJ prices are likely to remain firm.

The larger Florida orange crop and a higher juice yield will result in increased output of FCOJ in 1986/87. The forecast for 1986/87 juice yield is 1.44 gallons a box at 42.0 degrees Brix. In addition, more Florida oranges will likely be used for juice, because of lower stocks and the availability of more California oranges for the fresh market. Nevertheless, domestic supplies will still be small because of expected smaller carryin stocks. With ample supplies of FCOJ from Brazil and strong demand, imports will likely be relatively heavy.

The recent preliminary ruling by the Department of Commerce on the Brazilian FCOJ exported to the U.S. at less than fair value in violation of the anti-dumping law may affect FCOJ imports during 1986/87. The preliminary decision will require U.S. importers to post bonds or cash deposits for most of the imports from Brazil. The final decision on a permanent tariff is not scheduled until January 1987.

### **Florida Supply and Movement of Frozen Concentrate Orange Juice**



Florida packers processed 24.2 million gallons of frozen concentrated grapefruit juice (FCGJ) during 1985/86, down slightly from the previous season. The reduced pack and smaller carryin stocks have pushed the FCGJ supply for 1985/86 below last season. Despite higher prices, movement has been relatively good, amounting to 22.8 million gallons through mid-October, almost the same as a year ago. The f.o.b. price for FCGJ has been steady at \$4.17 per dozen 6-ounce cans (private brand, Florida canneries), compared with \$3.87 a year ago. The slightly reduced movement more than offset the smaller carryin stocks and reduced pack, pushing stocks as of October 11 to moderately above a year ago.

Even with a larger crop, the total pack of FCGJ for 1986/87 may not increase appreciably, because of potentially increasing carryin stocks. However, 1986/87 supplies should still meet domestic demand. If demand remains relatively strong, adequate supplies will probably not cause prices to rise appreciably.

#### *Increased Pack of Chilled Citrus Juice Likely*

During 1985/86, Florida packers processed 318 million gallons of chilled orange juice (including fresh fruit, single-strength reprocessed, and reconstituted FCOJ), up 15 percent from 1984/85. Because of lower prices, movement was strong throughout the season. The f.o.b. price has been steady at \$9.14 per dozen 32-ounce glass containers (Florida canneries), compared with \$9.97 a year ago.

Rising demand, combined with a larger crop and higher juice yield, will result in a larger pack of chilled orange juice in 1986/87. With ample supplies of Brazilian FCOJ and strong demand, imports are likely to remain large in 1986/87. This FCOJ is reconstituted to chilled orange juice. The recent price hike on FCOJ by Brazilian exporters is likely to strengthen wholesale prices of chilled orange juice if demand stays up.

Florida packers also processed 34 million gallons of chilled grapefruit juice (excluding single-strength reprocessed), up 5 percent from 1984/85. Despite higher prices, movement was relatively strong, up 3 percent

from last season. The f.o.b. price is around \$9.60 per case of half dozen 64-ounce glass jars (private brand, Florida canneries), compared with \$8.85 a year ago. The larger pack more than offset increased movement and reduced carryin stocks, leaving chilled grapefruit juice stocks at the end of the season 25 percent above the previous season. With a larger crop and rising demand, the 1986/87 pack will be up, making the total supply greater than last season and keeping prices steady.

#### *Overall Canned Citrus Juice Down Slightly*

The canned citrus pack registered a mixed performance in 1985/86, with a larger pack of orange juice but smaller packs for both grapefruit and blend juices. The total pack of canned citrus juice was 18.1 million cases (24-2's), down 3 percent from 1984/85.

Florida output of canned grapefruit juice, the leading item, totaled 9.95 million cases (24-2's) in 1985/86, down 6 percent from 1984/85. The smaller output and lower carryin stocks resulted in a canned grapefruit juice supply which was moderately less last season. Because of higher prices, movement was sluggish. The current f.o.b. price for canned grapefruit juice is \$10.15 per dozen 46-ounce cans (sweetened and unsweetened), compared with \$9.65 last year. Even with the larger crop, slow movement and larger carryin stocks are not likely to result in a larger output this season. Prices may weaken somewhat.

Florida packers processed 7.6 million cases of canned orange juice (24-2's) in 1985/86, up slightly from 1984/85. However, because of smaller carryin stocks, the total supply was slightly smaller than 1984/85. Movement continued its decline, off 3 percent despite lower prices. Florida packers recently announced a price hike to \$10.75 from \$10 per dozen 46-ounce cans (single-strength sweetened and unsweetened), effective October 20 although orders at prior levels were accepted through November 3. This compares with \$11.60 year ago. The increased pack more than offset reduced carryin stocks and movement, leaving carryover stocks substantially higher. Consequently, the larger crop is not likely to result in increased pack.

## FRESH NONCITRUS

The 1986 noncitrus crop—including major tree fruits, grapes, and cranberries—is forecast at 11.8 million tons, down 8 percent from last season. Adverse spring weather in California caused most of the decline, which primarily reflects lower production of grapes, prunes, and plums. The apple crop is down 3 percent from 1985. The pear crop is estimated to be 5 percent smaller, with a 9-percent reduction in winter pear production. Consequently, fresh noncitrus fruit supplies will be lower this fall and early winter, and prices are likely to be higher than a year ago.

### Apples

#### *Crop Down Fractionally*

The final forecast of the 1986 U.S. apple crop placed production at 7.74 billion pounds, down 3 percent from 1985. Since August 1, production prospects declined in the Central and Eastern States, but remained unchanged in the West.

The forecast for the Eastern States, 2.99 billion pounds, is down 6 percent from last year, mainly because of smaller crops in New York and North Carolina. Larger crops from Pennsylvania and Virginia are only partially offsetting. New York, the leading apple State in the East, expects a crop of 950 million pounds, off 15 percent from last year. The North Carolina crop, forecast at 100 million

Table 7.—Noncitrus fruit: Total production, United States, 1984, 1985, and indicated 1986

Crop	1984	1985	1986
1,000 tons			
Apples	4,166	3,975	3,869
Apricots	127	132	69
Cherries, sweet	182	133	140
Cherries, tart	136	143	115
Cranberries	166	176	180
Grapes	5,194	5,605	4,908
Nectarines	183	211	195
Peaches	1,330	1,074	1,139
Pears	710	747	711
Prunes and plums	721	642	462
Total	12,915	12,838	11,788

SOURCE: Crop Production, NASS, USDA.

Table 8.—Apples: Regional production, 1984, 1985, and indicated 1986

Area	1984 1/	1985 1/	1986
Billion pounds			
East	3.26	3.17	2.99
Central	1.22	1.64	1.01
West	3.85	3.14	3.74
Total U.S.	8.33	7.95	7.74

1/ Includes unharvested production and harvested not sold (million pounds): United States: 1984-14.9 and 1985-87.7.

SOURCE: Crop Production, NASS, USDA.

pounds, is down 64 percent from 1985 because of late April and early May freezes and the drought. Pennsylvania's crop is estimated at 610 million pounds, up 4 percent from 1985. Virginia production, at 510 million pounds, is 29 percent larger.

In the Central States, crop prospects, at 1.01 billion pounds, are down 39 percent from 1985. The decrease is primarily in Michigan, whose crop of 650 million pounds is down 41 percent. Crops in Illinois and Ohio were also off 13 and 38 percent, respectively. The spring frost damaged crops in these States.

The apple crop in the Western States is forecast at 3.74 billion pounds, up 19 percent from last year. Washington, the Nation's leading apple State, expects 2.95 billion pounds, up 44 percent from 1985's small harvest. However, reduced crops were reported for all other States in the region, with a crop of 500 million pounds from California, the second largest State in the region, off 19 percent.

#### *Market Prospects Good*

Shipments of fresh apples are running well ahead of last year's pace because of an earlier harvest. The increased shipments so far are primarily caused by the rising movement from California and Washington. Combined shipments from these two States accounted for over 52 percent of the total, compared with 34 percent a year ago.

Opening f.o.b. prices for fresh apples at major shipping points showed a mixed pattern.

Sharply higher prices were reported in most regions, reflecting smaller crops. However, prices have declined with seasonally increased shipments. In early October, the f.o.b. price for Red Delicious apples in Yakima Valley-Wenatchee, Washington was \$15.00 a tray pack, sizes 88-113, U.S. Extra Fancy, compared with \$14.50 a year ago.

With smaller supplies of fresh apples in the Central and Eastern regions, and rising demand, prices are expected to stay relatively firm through the winter. However, the larger orange crop may depress apple prices somewhat. Marketings will be affected by controversy over the use of daminozide on some apples, because several supermarket chains and processors have announced a ban on buying daminozide-treated apples. Daminozide helps to keep the apples from dropping off the tree before they are ripe, protects them from bruises, and helps them to stay crisp and fresh during storage.

With the smaller crops from the East and Central States, apple prices for processing will likely be relatively firm, even though processor demand does not look favorable. The industry estimates that inventories of processed apple products are generally up somewhat from last year and from normal. Demand for apple juice is likely to remain

strong. Imports of apple juice continued heavy during 1985/86, up 6 percent from the preceding season.

A further increase in apple juice imports would moderate price increases for processing use. Nevertheless, many Michigan packers have agreed on minimum prices which are moderately to substantially higher than a year ago, depending on varieties. The minimum price for Northern Spy (2-2 1/2 inches and up) was agreed at \$9.25 per cwt., compared with \$8.50 last year. The agreed upon price for straight loads of juice apples is \$4.75 per cwt., compared with \$3.50 a year ago. In the East, apples for U.S. No. 1 Canner Grade, size 2-3/4 inches and up, were offered in New York at \$7.00 per cwt., compared with \$6.70 a year ago. Prices of canned apple products are expected to remain firm.

Export demand will also be important to apple prices. Export prospects are likely to improve somewhat, because of larger supplies of fresh apples from Washington and the weak dollar. In addition, boycotts of South African apples from some European countries are likely to strengthen U.S. markets. Exports to Canada, the United States' major customer, are encouraging because of Canada's significantly smaller crop. Also, the Targeted Export Assistance Program (TEA) is intended to help offset the adverse effects of subsidized EC competition on U.S. exports. The \$1.4 million in TEA resources will be directed to supporting new promotional activities in the United Kingdom and expanding activities to Scandinavian and Pacific Rim markets.

Table 9.--Red Delicious Apples: Shipping point prices, selected regions, 1985 and 1986

Shipping points	Early-October f.o.b. prices		Units
	1985	1986	
Western Michigan	6.00	10.00	Per carton, U.S. Fancy 2 1/4" up, 12-3 lb. film bags
Appalachian District	10.75	11.88	U.S. Comb. Extra Fancy and Fancy, tray pack, 88-113's
Yakima Valley, Washington	14.50	15.00	Per carton, tray pack, Wash., State Extra Fancy, 80-113's

SOURCE: F.o.b. prices, AMS, USDA.

Retail prices of fresh apples have been well above a year ago. In September, retail prices for Red Delicious averaged 92.5 cents a pound, compared with 67.1 cents a year ago. Nevertheless, prices dropped substantially in September. As the season progresses, retail prices will decline further in the late fall and early winter.

### Avocados

#### Crop Plummets

The 1986/87 Florida avocado crop for certified shipments is forecast at 900,000 bushels, off 19 percent from last season and 32 percent below the 1982/83 record. Summer

varieties were affected by strong winds and heavy rainfall in late March, which led to a very light fruit set. Fall and winter varieties were not as affected, but most have a lighter set than last season.

Reflecting the smaller crop, shipments through September totaled 358,700 bushels, down 27 percent from last year. The reduced shipments have kept f.o.b. prices relatively firm. For the week of October 3, the shipping point price for Florida avocados was \$5.13 a flat carton (8-14's at Dade County), the same as a year ago. Prices are expected to remain strong because of the smaller crop and seasonally declining California supplies.

The California avocado shipment estimate for the 1985/86 season, which ends October 31 as reported by the California Avocado Commission, is 6.05 million bushels, off 24 percent from last season. This will be the lowest since 1979/80's 3-million-bushel equivalent. Shipments through September, at 5.77 million bushels, have been running substantially behind last season's pace. However, f.o.b. prices were significantly below last year's unusual high. With seasonally reduced supplies, prices have strengthened somewhat. The season average price received by growers will still likely be above last year's \$1,000 a ton.

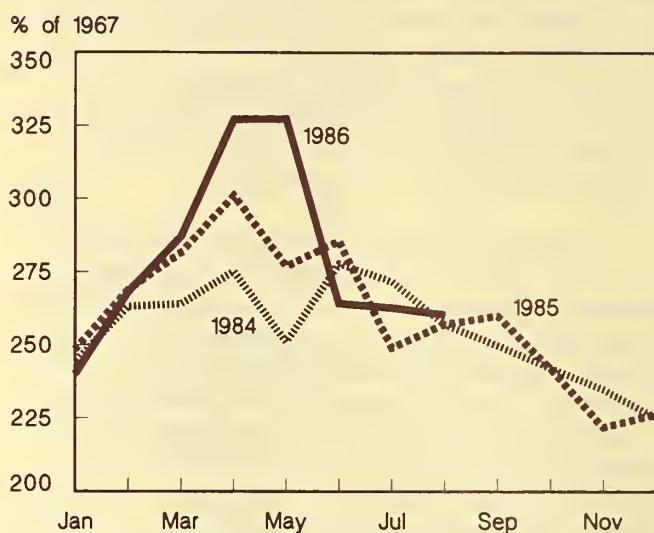
### Bananas

#### *Imports Down Fractionally*

During the first 8 months of 1986, U.S. banana imports totaled 2.01 million metric tons, down fractionally from a year earlier. The reduction was due primarily to smaller shipments from Ecuador, Honduras, and Panama. Although imports from Ecuador fell slightly, Ecuador still retains its position as the top supplier. Imports from Ecuador may decline further because of recent low temperatures in the important banana area of Machola. These conditions affect the budding of the plants, reducing the production forecast of 1.8 million metric tons by as much as 30 percent.

Imports from Honduras were down 9 percent from last year. Consequently, Honduras dropped to the third largest supplier. There was a sharp decrease in

### Bananas: BLS Consumer Price Index



imports from Panama. With an increase of 6 percent from a year ago, Costa Rica is now the second leading supplier. There was also a significant increase in imports from Colombia.

Because of the smaller imports, the U.S. average retail price this year through September was 39.4 cents a pound, up moderately from a year ago. U.S. average retail price was 36.9 cents a pound in September, compared with 36.1 a year ago.

### Cherries

#### *Sweet Cherry Crop Up Moderately*

The 1986 sweet cherry crop totaled 139,610 tons, 5 percent more than 1985. Washington, the leading producing State, totaled 61,400 tons, an increase of 62 percent from 1985. Oregon moved to second place, with a crop of 40,000 tons, up 38 percent from last year. California, with 8,400 tons, dropped behind Michigan to fourth place and is 64 percent below 1985 production. Altogether, Pacific Coast States accounted for 79 percent of the 1986 sweet cherry crop, compared with 68 percent last year. The Michigan crop, at 21,000 tons, was down 32 percent from a year ago.

Because of the larger crop, grower prices for 1986 fresh sweet cherries averaged \$1,171 a ton, compared with \$1,192 a year ago. In contrast, reduced available processing supplies strengthened grower prices of processing sweet cherries to \$555 a ton, compared with

Table 10.--Sweet cherries: Production, use, price, and value, United States, 1983-86 crops

Crop	Production 1/			Uses			Price per ton	Value of used production		
	Total	Used	Fresh	Processed (fresh equivalent)						
				Canned	Brined	Other 2/				
				1,000 short tons			Dollars	1,000 dollars		
1983	181.2	168.8	95.1	11.1	45.3	17.3	630	106,288		
1984	181.8	164.3	90.5	9.4	50.5	13.9	609	100,096		
1985	132.5	126.5	53.0	11.3	51.4	10.8	799	101,033		
1986	139.6	138.6	67.5	7.3	53.3	10.5	855	118,500		

1/ Difference between total and used is quantities harvested but not sold and quantities not harvested.  
 2/ Includes frozen, juice, jelly, etc.

SOURCE: Crop Production, NASS, USDA.

\$515 last year. Overall prices for sweet cherries averaged \$855 a ton, up 7 percent from 1985.

Of 1986's utilized production, 49 percent was sold fresh and 51 percent was processed. Smaller supplies of other summer fruit and higher prices caused increased sales to the fresh market, up 27 percent from a year ago. Consequently, the quantity for processing use fell 3 percent from last year. The quantity of sweet cherries used for brining increased 4 percent, but those for canning, freezing, juice, jelly, etc. were down 35 and 2 percent, respectively. Therefore, sweet cherries for brining accounted for 75 percent of total processing use, compared with 70 percent last

year. The following table shows use of the U.S. sweet cherry crop during the last 4 years.

#### Tart Cherry Crop Down Sharply

U.S. production of tart cherries totaled 229.1 million pounds, 20 percent less than 1985. The four Great Lake States produced 204 million pounds, 89 percent of total production, compared with 257 million in 1985. Michigan, the leading tart cherry State, produced 175 million pounds, compared with 220 million last year. New York, the second largest producer, had a crop of 13 million pounds, down 42 percent. Consequently, Utah, with a crop of 18.5 million pounds, replaced New York as the second leading producer.

Table 11.--Tart cherries: Production, use, price, and value, United States, 1983-86 crops

Crop	Production 1/			Uses			Price per ton	Value of used production		
	Total	Used	Fresh	Processed (fresh equivalent)						
				Canned	Frozen	Other 3/				
				1,000 short tons			Dollars	1,000 dollars		
1983	77.3	76.8	2.7	18.7	52.6	2.9	932	71,506		
1984	135.8	128.0	4.0	36.8	83.3	3.9	500	64,004		
1985	143.1	140.1	3.8	30.5	103.4	2.5	448	62,848		
1986	114.6	111.6	2.8	24.4	80.2	4.3	474	52,974		

1/ Difference between total and used is quantities harvested but not sold and quantities not harvested.  
 2/ Some totals do not add because of rounding. 3/ Includes juices, wine, jam, etc.

SOURCE: Crop Production, NASS, USDA.

Increased production was also indicated for Pennsylvania, while Wisconsin produced a much smaller crop. Overall production in the Western States also showed a significant decrease.

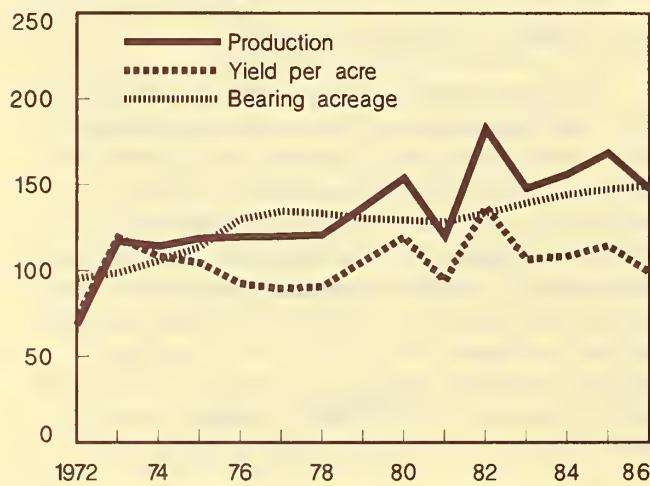
Because of relatively large stocks of frozen tart cherries, grower prices for 1986 averaged 23.7 cents a pound, up only 6 percent from last year. However, with the smaller production, the crop is valued at \$53 million, down 16 percent from 1985.

The smaller crop resulted in decreased use for all outlets except those for juice, wine, jam, etc. The following table shows the use of tart cherries during the last 4 years.

## California Grapes: Acreage, Yield, and Production

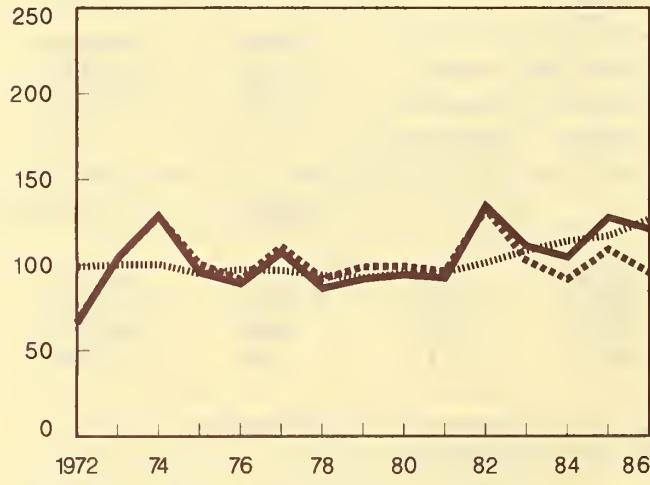
### Total Grapes

% of 1972-1974 average



### Table Grapes

% of 1972-1974 average



1985 preliminary. 1986 indicated

### Grapes

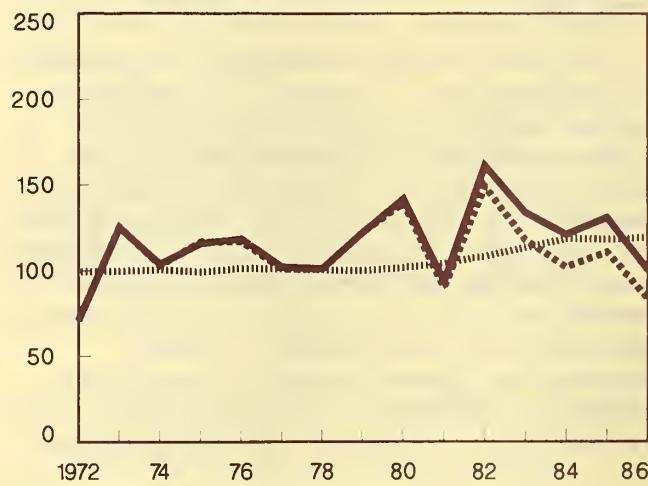
#### Substantially Smaller Grape Crop Forecast

The final forecast for the 1986 U.S. grape crop is 4.91 million tons, down 12 percent from last year. Prospects in California point to a crop of 4.45 million tons, compared with 5.20 million in 1985. Consequently, the California crop accounts for 91 percent of the U.S. total this year, down from 93 percent in 1985.

The California raisin-type grape forecast is 1.90 million tons, 23 percent below 1985. California's wine-type grapes, at 2 million tons, are forecast 7 percent below a year ago.

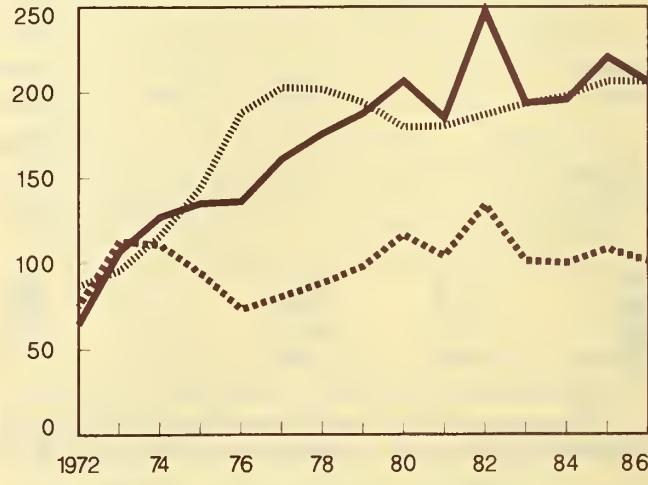
### Raisin Grapes

% of 1972-1974 average



### Wine Grapes

% of 1972-1974 average



A larger quantity of wine-type grapes than a year ago were crushed for wine through mid-October, making the 1986 season one of the earliest on record. Labor strikes at several major wineries have had little effect on overall harvest progress. Harvest temperatures have been higher than normal, keeping grape maturity at a record pace. The output of table-type grapes, at 550,000 tons, is 5 percent less than last year. The reduced California production is due mainly to smaller yields. Trends for bearing acreage, production, and yield per acre for California grapes by type are shown in the chart.

Reflecting primarily increased crops in New York and Washington, total grape production in States other than California is estimated at 457,500 tons, up 14 percent from 1985. The New York crop is forecast at 165,000 tons, up 13 percent. The crop has been plagued by mildew and black rot, caused by excessive moisture and high humidity during the growing season. Some berry

splitting has also been noted, especially on Concords, most of which are utilized for juice.

The Washington forecast, at 155,000 tons, is 34 percent above 1985. Crop prospects improved from September, but the forecast is still down slightly from the August estimate.

#### *Higher Prices Expected*

Because of a smaller crop, shipments of table grapes through mid-October totaled 949 million pounds, off slightly from a year earlier. In response to strong demand and seasonally reduced supplies, f.o.b. prices for fresh grapes have strengthened further. By early October, the f.o.b. price for Thompson Seedless was quoted at \$9 a 23-pound lug in the central San Joaquin Valley, compared with \$6 a year ago.

Fresh market grape supplies will be down this season because of the smaller crop. In addition, the use of table grapes for the fresh market is not expected to rise appreciably.

Table 12.--Grapes: Total production and season-average prices received by growers in principal States, 1984, 1985, and indicated 1986

State	Production 1/			Price per ton 2/	
	1984	1985	1986	1984	1985
		Tons		Dollars	
New York	198,000	146,000	165,000	180.00	147.00
Pennsylvania	60,000	50,000	55,000	143.00	148.00
Ohio	11,200	7,000	10,000	214.00	135.00
Michigan	49,000	51,000	35,000	166.00	164.00
Missouri	3,100	900	2,300	273.00	362.00
North Carolina	5,900	1,500	2,500	341.00	316.00
Georgia	2,700	2,100	2,000	582.00	494.00
South Carolina	2,500	600	700	339.00	372.00
Arkansas	9,000	8,000	6,000	180.00	129.00
Arizona	14,000	18,500	24,000	1,310.00	968.00
Washington	168,500	116,100	155,000	124.00	178.00
California:					
Wine	1,900,000	2,140,000	2,000,000	201.00	184.00
Table	475,000	580,000	550,000	304.00	230.00
Raisin 3/	2,295,000	2,483,000	1,900,000	158.00	142.00
Dried 4/	334,500	345,000	--	635.00	612.00
Not dried	892,000	930,00	--	161.00	153.00
All	4,670,000	5,203,000	4,450,000	189.00	169.00
United States	5,193,900	5,604,700	4,907,500	190.00	171.00

1/ Includes unharvested production and harvested not sold (tons): United States 1984-25,500 and 1985-100. 2/ Price derived from unrounded data for California all varieties and raisin varieties.

3/ Fresh equivalent of dried and not dried. Excludes production from approximately 50,000 acres of Thompson Seedless vineyard in the voluntary raisin diversion program for 1986. 4/ Dried basis, 1 ton of raisins is equivalent to 4.48 tons of fresh grapes for 1983, 4.15 tons for 1984, and 4.50 tons for 1985.

SOURCES: Production, Crop Production and Prices, Noncitrus Fruits and Nuts Mid-Year Supplement, NASS, USDA.

The market for competing uses of multipurpose varieties, particularly Thompson Seedless, will likely be strong because of larger domestic wine shipments, improved demand for raisins, and the smaller crop. Consequently, the 1986 average grower price for fresh grapes is projected to be above 1985.

Despite the smaller crop, California handlers received 163,688 tons (excluding delivered diversion certificates) of raisins through October 18, compared with 137,548 a year earlier. The increase is due largely to the earlier maturity of the crop. Nevertheless, the smaller grape crop is likely to reduce raisin output this season. But with a relatively large stock, the total supply of raisins for the 1986/87 marketing season should be adequate. The strong shipments of California wine and the smaller wine-grape crop have resulted in higher wine-grape prices. Prices vary greatly among producing areas, supplies, and varieties of grapes.

#### *Smaller Crush Expected*

Reported use of California grapes for crushing through October 11 totaled 2.70 million tons (fresh basis), compared with 2.66 million a year earlier. Increases were recorded for both table and wine grapes, while raisin grapes crushed for wine were down moderately. Nevertheless, the overall quantity of grapes for crushing is expected to be less than last year. Larger crops in States outside California--especially New York and Washington--are expected to result in a larger crush of Concord and other American-type grapes.

California wine shipments to all markets have been strong. Shipments for the first 7 months of 1986 were substantially above a year earlier. In contrast, foreign wine shipments registered a 19-percent decrease from a year ago because of higher prices resulting from the weak dollar. Therefore, the strong domestic shipments have held wine prices above a year ago. The BLS Consumer Price Index for all wine during the first 9 months of this year averaged slightly above a year ago. With higher grower prices for wine grapes, and strong domestic shipments, wine prices are likely to remain above a year ago.

#### *Pears*

##### *Crop Down Moderately*

The final forecast for the U.S. pear crop is 710,450 tons, 5 percent less than the 1985 crop. Output of Bartlett pears in California, Oregon, and Washington is forecast at 450,000 tons, down 4 percent from last year. California's Bartlett production is 285,000 tons, up slightly, while output of Bartlett pears in Oregon and Washington is down 27 and 1 percent, respectively.

Production of Pacific Coast pears other than Bartletts is forecast at 220,000 tons, off 9 percent from last year. Reduced production is reported for all three States. These pears are mostly marketed fresh during the winter and spring.

##### *Higher Winter Pear Prices Expected*

Despite smaller Bartlett pear production, shipments are running moderately ahead of last year's pace. Because of sluggish movement and larger carryover stocks of canned pears, more Bartletts are likely to be marketed for fresh use. F.o.b. prices for Bartletts at shipping point have fluctuated near last year's levels. In early October, the f.o.b. price quotation for Bartlett pears at Yakima Valley, Washington was \$14.00 a box, U.S. No. 1, sizes 90-135, compared with \$13.50 a year ago.

Sluggish movement has also resulted in a lower contract price for California Bartlett pears for canning use. California growers and

Table 13.--Pears: Shipping point prices, selected regions 1985 and 1986

Shipping points	Early-October f.o.b. prices		Units
	1985	1986	
Lake County Dist., California: Bartlett	--	14.20	U.S. No. 1, std. box wrapped pack, 90-135's
Yakima Valley, Washington: Bartlett	13.50	14.00	U.S. No. 1, std. box wrapped pack, 90-135's

SOURCE: F.o.b. prices, AMS, USDA.

canners have agreed on a field price of \$177 a ton, compared with \$206 a year ago. The field price has also been settled at \$177 a ton in the Northwest.

Because of the smaller crop, opening prices of winter pears at shipping points were moderately above a year ago. The f.o.b. price for D'Anjou in Yakima Valley, Washington was quoted at \$17-18 a carton (size 80-90) during the week of October 16, compared with \$12.00 a year ago. Prices for winter pears are expected to remain firm, in light of reduced supplies and less competition from apples.

#### *Export Prospects Unfavorable*

Exports of fresh pears took off to a fast start. During the first 2 months of 1986/87 (July and August), exports of fresh pears totaled 4,069 metric tons, up 19 percent from a year ago. Most of the increase was in shipments to Canada. In contrast, purchases from most other areas declined. Prospects for U.S. exports of fresh pears do not look favorable because of reduced supplies and expected higher prices. However, the weak dollar may moderate any decline in exports.

#### **PROCESSED NONCITRUS**

The outlook for processed noncitrus fruit during 1986/87 is mixed. Even though the canned fruit pack is expected to be down for some items, increased stocks will still result in generally adequate supplies. F.o.b. prices have advanced because of strong movement of several canned fruit. Supplies of raisins will be smaller than a year ago because of a reduced output, even though the carryin stock is larger. In contrast, the smaller prune crop will drop supplies below a year ago, even with a slightly larger carryin stock. Prices of dried fruit will likely be firm if demand remains strong.

The total supply of frozen fruit and berries will be less than last year. The frozen strawberry pack is likely to be near last year's levels, but the frozen cherry output is much smaller than a year ago. Frozen strawberry prices are likely to strengthen.

#### *Smaller Canned Fruit Pack*

Reduced crops of Clingstone peaches, Bartlett pears, and plums have resulted in less

canning than last year. But the larger carryin stocks are likely to keep supplies of most canned fruit adequate during 1986/87.

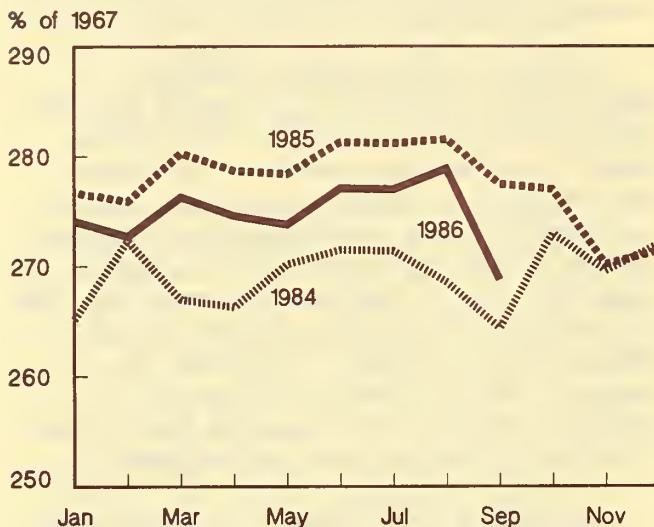
A trade source indicates that the unaudited pack of canned Clingstone peaches totaled 15.3 million cases (No. 24/2 1/2's), down 12 percent from last year. Because of smaller crops of Clingstone peaches, grapes and Bartlett pears, a substantially decreased pack of canned fruit cocktail--8.9 million cases (No. 24/2 1/2's)--was also reported. The canned mixed fruit pack amounted to 1.8 million cases (No. 24/2 1/2's), down 28 percent. Packs of canned apricots and freestone peaches were reported down 67 and 25 percent from last year, respectively.

Because of the smaller crop in Michigan, the leading cherry-producing State, the total pack of canned tart cherries is expected to be sharply below last year. The tonnage of Michigan sweet cherries for canning was also down significantly from 1985. According to the Northwest Food Processors Association, Northwest cannery packed 156,727 cases (24-2 1/2's) of tart sweet cherries, down 28 percent from last year. The 1986 pack of canned light sweet cherries totaled 85,330 cases (24 2 1/2's), up 1 percent. Even with larger carryin stocks, the total supply of canned dark sweet cherries is the smallest in at least a decade. With smaller carryin stocks, the season's supply of canned light sweet cherries is also the lowest in at least 10 years. Thus, overall supplies of canned cherries should be tight in the Northwest.

The smaller plum crop in California will push the 1986 canned purple plum pack significantly below last year. However, with a much larger carryin stock, total supplies of canned purple plums will be adequate for 1986/87.

The smaller apple crops from the Eastern and Central States will reduce the canned apple-product pack. With generally slow movement of canned apples and applesauce, the carryover stocks are likely to be relatively high. Consequently, supplies of canned apples and applesauce may still be adequate to meet market demand. Rising demand for canned apple juice may still direct more apples for processing juice. Nevertheless, imports of apple juice have been rising, so supplies should be ample. Because of smaller crop, packers

## Canned Fruit: BLS Producer Price Index



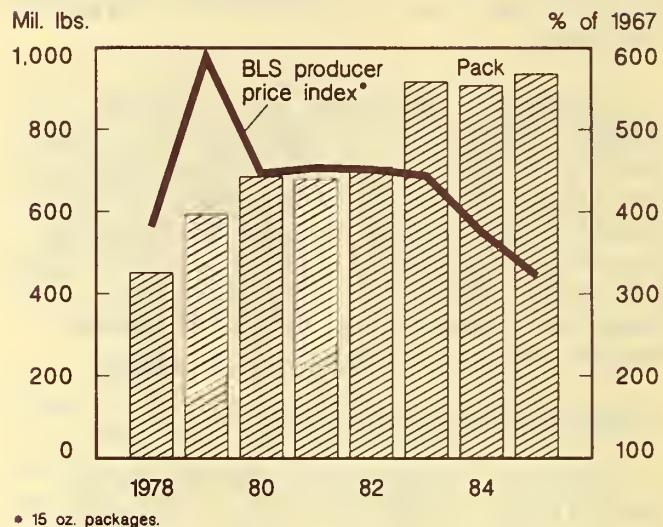
are bidding up prices for Michigan apples to levels that are moderately to substantially higher than a year ago.

Prospects for canned fruit prices are mixed. Even with lower costs of clingstone peaches and Bartletts, prices for several canned items have advanced because of strong movement. The tight supply of canned cherries should strengthen prices. Canned apple items may rise somewhat because of higher costs of fruit. Wholesale prices of canned fruit for this year have been slightly below a year ago. The BLS September producer price index for canned fruit, at 268.8 (1967=100), was almost 3 percent below a year ago.

### Dried Fruit Output Down

With the smaller California grape crop and increased use of the raisin grape crop by wineries, output of raisins this season is expected to be substantially less than last year. At present, the trade is forecasting a total of 227,000 tons, compared with 345,000 last year. Even with the smaller production, large carryin stocks in the reserve pool from the Diversion program will result in adequate supplies during 1986/87. Nevertheless, higher prices for raisin grapes have been announced because of the increased demand from wineries. Growers and packers have agreed on a field price of \$885 a ton for free tonnage for Thompson Seedless grapes, compared with \$810 a year ago. Consequently, raisin prices will remain firm in response to strong shipments and the higher field price.

## U.S. Raisin Pack and Producer Price Index



Demand for raisins abroad has been strong. According to the Raisin Administrative Committee, export shipments during the first 2 months of 1986/87 increased 46 percent from a year ago. Exports to the EC, particularly the United Kingdom, showed a strong gain. Japan, the leading importer of U.S. raisins, has bought 55 percent more than a year ago. The weakening dollar and increased promotion have contributed to strong demand for U.S. raisins abroad.

Production of dried prunes, the other major dried fruit, is estimated at 95,000 tons (natural conditions), down 32 percent from 1985. With a fractionally larger carryin stock, the total supply of dried prunes for 1986/87 is estimated at 155,098 tons, down 21 percent from last year, according to the Prune Marketing Committee.

Early-season shipments of dried prunes through September totaled 25,067 tons, up 13 percent from a year ago. The rise was due primarily to larger exports, while deliveries to domestic markets were up only slightly. Exports recorded a 32-percent increase, primarily reflecting shipments to Spain, Japan, and West Germany. With the weakening dollar, prospects for export demand are bright. The September BLS producer price index for dried prunes stood at 286.4 (1967=100), the same as a year ago. Despite the smaller supply, opening prices for private label dried prunes are unchanged from a year ago.

## Frozen Fruit and Berry Pack Will Vary

The 1986 pack of frozen fruit and berries will vary this season. High grower prices increased deliveries of strawberries to freezers. Freezers in California, the leading State, received 167 million pounds through September 27, up 3 percent from a year earlier. U.S. imports of frozen strawberries from Mexico totaled 37.1 million pounds through September 14, down 9 percent from a year earlier. Deliveries of strawberries to freezers in Oregon and Washington showed slight decreases this season from last season.

Freezers' receipts of blackberries through late September were down substantially in Oregon, but up sharply in Washington. Overall receipts of blackberries this season are expected to be down moderately from last season. During the same period, deliveries of blueberries to freezers in Oregon and Washington declined from last year.

With a smaller crop, a total of 160.4 million pounds of tart cherries were used for freezing, compared with 206.8 million in 1985. However, larger carryin stocks still result in total supplies of frozen tart cherries relatively large.

Table 14.—Stocks of frozen fruit:  
End of September, 1983-86

Frozen fruit	1983	1984	1985	1986
1,000 pounds				
Apples	36,869	31,204	32,016	44,686
Apricots	10,816	13,098	9,294	6,984
Blackberries	17,139	21,225	17,770	20,428
Blueberries	69,027	68,817	77,714	69,858
Boysenberries	3,481	3,376	3,358	3,935
Cherries 1/	90,271	139,847	205,667	195,703
Grapes	4,001	6,262	5,012	2,184
Peaches	51,807	62,945	56,537	60,757
Raspberries, red	31,563	37,999	33,998	37,622
Strawberries	220,705	229,485	231,962	199,051
Other frozen fruits	89,493	90,543	83,785	98,430
Total frozen fruits	625,172	704,801	757,113	739,638

1/ Includes both sweet and tart cherries.

SOURCE: Cold Storage, NASS, USDA.

## Cold Storage Stocks Down

As of October 1, cold storage holdings of frozen fruit and berries totaled 740 million tons, down slightly from a year ago. Substantially lower supplies were recorded for apricots, blueberries, cherries, grapes, and strawberries, which were partially offset by increased stocks of apples, blackberries, boysenberries, peaches, and red raspberries. Demand for frozen fruit and berries will likely stay relatively strong. Smaller supplies, coupled with higher costs for crops, should keep prices firm.

### BERRIES

#### Cranberries

##### Record Crop Expected

The forecast for the 1986 U.S. cranberry crop is a record-high 3.59 million barrels (163,000 metric tons), up 2 percent from 1985 and 8 percent more than the 1984 crop. Larger crops were reported for Massachusetts and Oregon, but were partially offset by smaller estimates for New Jersey, Washington, and Wisconsin. At 1.8 million barrels, Massachusetts, the leading State, will harvest a crop 7 percent above a year ago and up 8 percent from 1984. Bogs over-wintered well and survived numerous spring frosts with little injury. Hail in late May caused localized damage, but ideal conditions have prevailed since then. Fruit set was average to heavy, and berries are medium to large with excellent quality. Production in Oregon is forecast at 120,000 barrels, 20 percent more than last year and 46 percent greater than 1984. Fruit set was generally excellent and crop development has been good.

Production in Wisconsin, the second largest cranberry State, is forecast at 1.25 million barrels, down 1 percent from 1985 but up 4 percent from 1984. Heavy rains during bloom damaged the crop in west-central growing areas, and there has been some insect damage. Growing conditions have been good, with the season one to two weeks ahead of normal. Berry set and size have been generally good.

New Jersey expects a crop of 300,000 barrels, down 6 percent from 1985 but up 9

percent from 1984. Bloom and fruit set were average to heavy. Heavy rain and hail have injured the crop, but the major concern is the availability of water, as soil moisture and rainfall have been less than normal. The Washington crop is forecast at 120,000 barrels, 19 percent less than last year but 17 percent more than 1984. A staggered, longer-than-normal bloom resulted in large variations in fruit set and size. Bloom was lighter than normal in many bogs, and the cool, wet weather affected berry size.

Because of a larger crop, shipments have been running well ahead of last year's pace. Season-opening prices for fresh cranberries from Massachusetts in the Chicago Wholesale Market were the same as a year earlier. As the season has progressed, prices have declined. For the week ending October 8, the wholesale price was quoted at \$14.75-15.00 a carton (24-12-ounce filling bag). Even with a record crop, strong demand is not likely to weaken prices appreciably.

## TREE NUTS

## Almonds

## *Crop Plummets*

The 1986 California almond crop was forecast at 265 million pounds, shelled basis, 43 percent below last year and 55 percent less than the 590-million-pound record set in 1984. Too much rain in major production areas during the critical bloom period hurt the crop. Bearing acreage continues to increase; the latest forecast is 418,000, compared with 409,243 in 1985. Consequently, with the smaller crop, the yield fell sharply from 1,136 pounds, shelled basis, per acre in 1985 to 634 pounds in 1986. The smaller crop, combined with sharply reduced carryin stocks, will result in tight supplies for the 1986/87 marketing season. Italian almond production is estimated 20 percent above 1985, while the Spanish almond crop forecast is 20 percent lower. However, with a sharply larger carryin stock, the total supply of Spanish almonds will be moderately larger than last year's level.

Table 15.--Tree nuts: Production in principal States, 1984, 1985, and indicated 1986

Crop and States	1984	1985	Indicated 1986	Crop and States	1984	1985	Indicated 1986
1,000 pounds shelled basis				Short tons in-shell basis			
Almonds:				Pecans:			
California	590,00	465,000	265,000	North Carolina	1,450	500	1,500
				South Carolina	2,750	700	2,000
				Georgia	60,000	41,500	42,500
				Florida	2,500	1,400	2,500
Filberts:				Alabama	6,500	8,000	7,500
Oregon	13,200	24,300	17,000	Mississippi	2,750	3,250	3,750
Washington	200	300	300	Arkansas	750	850	800
2 States	13,400	24,600	17,300	Louisiana	2,500	7,500	7,500
Macadamia nuts:				Oklahoma	12,500	5,000	8,000
Hawaii	18,850	21,000	N.A.	Texas	12,500	39,000	20,000
Pistachios:				New Mexico	12,000	14,500	12,000
California	31,550	13,550	35,000	Total	116,200	122,200	108,050
Walnuts, English:				Improved varieties 1/	84,615	76,250	76,850
California	213,000	219,000	190,000	Native and seedling	31,585	45,950	31,200
				Total 5 tree nuts 2/	393,000	400,350	3/ 350,350

1/ Budded, grafted, or topworked varieties. 2/ Excludes almonds. 3/ Excludes Macadamia nuts.  
N.A. = Not available.

SOURCE: Crop Production, NASS, USDA.

According to the Almond Board of California, so far this season (July 1-September 30) domestic shipments totaled 39.4 million pounds, up 6 percent from a year ago. Primarily reflecting reduced shipments to West Germany and the Soviet Union, exports totaled 52 million tons, 49 percent less than a year ago. West Germany, the leading customer, has purchased 43 percent less, while the Soviet Union has not bought any so far this season. Shipments to the Soviet Union are likely to fall because of higher prices and the forecast for a sharply larger filbert crop in Turkey.

In contrast, shipments to Japan recorded a 42-percent increase, and Japanese demand is likely to improve further. USDA recently announced that it will use generic certificates to pay for the TEAP to help U.S. almond producers hurt by Egyptian and Indian import restrictions and the EC's refund program. The TEAP is aimed at increasing U.S. almond sales in Japan and Korea as well.

USDA also recently proposed a rule to increase the tolerance for edible almonds—an almond kernel with any defect scored as serious damage—from 0 to 3 percent in order to allow more almonds to be shipped because of the smaller projected 1986 crop. Prices for the 1986 crop have been established at substantially higher levels than a year ago, and prices received by growers will average well above 1985. The Almond Board of California has requested the Secretary of Agriculture to establish the 1986 almond crop to be 100 percent salable.

#### Filberts

##### *Significantly Smaller Crop But Still Third Largest*

The forecast of filberts in Oregon and Washington, at 17,300 tons (in-shell basis) in 1986, is the third largest crop on record, down 30 percent from last year's record 24,600 tons, but 29 percent above 1984. The Oregon crop is estimated at 17,000 tons, 30 percent below last year, while the Washington crop, at 300 tons, remained unchanged from 1985.

World filbert output is expected to show a substantial increase because of the larger Turkish crop. Turkey, the leading producer, expects a crop of 300,000 metric tons (in-shell

basis), up 43 percent from last year's unusually small output. Italy, the second largest producer, expects to harvest 100,000 metric tons, down 23 percent from 1985, while Spain will have a 37-percent-smaller crop. Nevertheless, total world commercial production will be 11 percent above 1985.

U.S. imports of filberts, mostly from Turkey, totaled 1,886 tons (shelled basis) for 1985/86, down 49 percent from 1984/85. Imports from Turkey accounted for 93 percent of the total, compared with 96 percent the previous season. The reduced imports were primarily attributed to smaller supplies from Turkey and larger available supplies in the United States. With the smaller U.S. crop and larger Turkish crop, filbert imports will likely increase from last season.

Because of the smaller crop, the opening price for U.S. filberts was quoted at 78 cents a pound in a 50-pound bag, (in-shell basis), compared with 76 cents a year ago. Filbert prices are expected to remain firm this season.

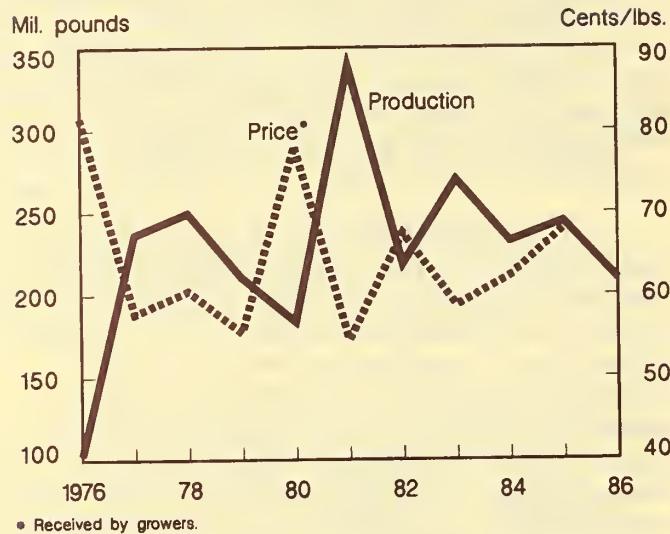
#### Pecans

##### *Significantly Reduced Crop Expected*

The October 1 forecast for the U.S. pecan crop places production at 216.1 million pounds, in-shell basis, 12 percent lower than last year and 7 percent below 1984. The smaller crop was mainly caused by reduced production in Alabama, New Mexico, and Texas. The Texas forecast, at 40 million pounds, is off 49 percent from last year. Texas has experienced hot, dry weather with insect and disease problems, as well as nut dropage higher than normal. The Alabama forecast is 15 million pounds, down 6 percent from last year. Pecan growers in Alabama have likewise experienced extremely dry conditions throughout the spring and summer. Trees are recovering from last year's hurricanes. New Mexico's forecast, at 24 million pounds, is down 17 percent from 1985.

Georgia, the leading State, expects to harvest 85 million pounds, up 2 percent from last year's hurricane-reduced crop. The record late-winter-through-August drought has seriously affected dryland pecans this year. After the drought broke in August, dry and record hot weather returned in September. Dryland nut size is expected to be

## U.S. Pecan Production and Prices



smaller than normal. Of the approximately 150,000 acres of commercial groves in Georgia, about one-third are irrigated. Larger crops are also indicated for Oklahoma, Florida and North Carolina, but these are only partially offsetting the decreases in the other States.

The reduced total production is due mostly to the much smaller native and seedling crops, which account for 29 percent of the total U.S. crop, compared with 38 percent last year.

Carryover stocks were moderately larger than a year ago. However, the total supply of pecans will still be smaller because of the smaller crop. Thus, pecan prices are likely to stay firm. Prices received by U.S. pecan growers averaged 68 cents a pound for all varieties in 1985.

### Pistachios

#### All-time High Production

The 1986 California pistachio crop is forecast at a record-high 70 million pounds, in-shell basis, more than two and one-half times last year's small production, and 11 percent higher than the previous record in 1984. This is the first-ever USDA forecast for California pistachio production, and will be the only forecast made this season. The increase is partially caused by the alternate bearing characteristics. However, the expansion in pistachio production also reflects

a steady upward trend in bearing acreage. During the last 5 years, California bearing acreage rose from 29,902 in 1982 to 32,000 in 1986.

Exports of pistachios, in-shell basis, totaled 1,236 metric tons during 1985/86, up 5 percent from a year ago. Canada, West Germany, and China are the major markets. However, increased shipments to Canada, West Germany, Latin America, and China more than offset decreased purchases from Belgium-Luxembourg, Australia, the United Kingdom, and Japan. Exports of shelled pistachios during the same period were up 15 percent from a year ago, with purchases from Mexico, the leading customer, up 106 percent.

Export movement during the 1986/87 season beginning September should continue strong due to the weakening dollar and the record crop. In addition, USDA recently announced that it will use generic certificates to pay for the TEA to promote pistachios in Japan, Hong Kong, Malaysia, Singapore, and Taiwan.

Imports of pistachios, in-shell basis, totaled 12,790 metric tons during 1985/86, up 35 percent from the preceding season. Almost 87 percent of the total imports were from Iran. However, imports of pistachios from Iran will decline in 1986/87, because the U.S. Department of Commerce has announced 317.89-percent (roasted) and 283.8-percent (raw) duties on imported Iranian pistachios effective August 21. Under the order, the International Trade Commission has directed Customs to continue to suspend liquidation of all entries, and to require a cash deposit in the amount of the bounties effective October 7.

Opening prices for the 1986 pistachio crop were about 15 percent below a year ago. The lower prices, combined with smaller crops of the other tree nuts, are expected to strengthen demand for pistachios during 1986/87. In 1985, the U.S. average grower price was \$1.41 a pound, compared with 98 cents in 1984. The 1986 grower prices are expected to average below last year's high.

## Walnuts

### *Significantly Smaller Crop*

As of September 1, the forecast for California walnuts is 190,000 tons, in-shell basis, 13 percent below last year's production. The crop was generally in fair condition. The yield varies greatly by variety, with the early varieties (Ashleys and Paynes) having very low set and the later varieties (Hartleys and Franquettes) having a good set. Quality is described as fair by most industry sources. The California walnut bearing acreage continues to increase; the latest forecast is 181,400 acres, compared with 177,880 in 1985. Consequently, the yield per acre

declined sharply to 1.05 ton, compared with 1.23 in 1985.

With a smaller crop and reduced carryin stocks, the 1986/87 supply of walnuts will be much smaller than last season. Because of the smaller supply, California packers are offering Light Half and Pieces walnuts at prices about 15 percent above a year earlier. Prospects for export shipments are favorable because of the weak dollar and the reduction of the 30-percent duty on U.S. walnuts exported to Europe to 8 percent.

The Walnut Marketing Board recommended to the Secretary of Agriculture that no volume regulations for walnuts be in effect for the 1986/87 marketing year.

## THE OUTLOOK FOR IRRADIATING FRESH FRUIT 1/

by

Rosanna Mentzer Morrison \*

**ABSTRACT:** Recent regulatory action permits irradiation of harvested fruits to delay ripening and control insects. This article discusses irradiation's potential applications and limitations for fresh fruits, its regulatory status, acceptance of the process by retailers, consumers, and our trading partners, and cost estimates for the treatment.

**Key words:** Fruit, irradiation, cost competitiveness, economies of scale, regulations, consumer acceptance.

The banning of the pesticide ethylene dibromide (EDB), and controversy over other agricultural chemicals, has heightened U.S. fruit handlers' interest in nonchemical alternatives. In selected cases, irradiation may substitute for postharvest fumigants, preservatives, and fungicides. Irradiation is exposure of products to ionizing energy (radiation) in order to achieve a variety of effects. Irradiation can be used on fruits to

delay ripening, rid harvested commodities of insects, and reduce postharvest disease. However, for each use and each particular fruit, the process has limitations.

In April 1986, the U.S. Food and Drug Administration (FDA) issued a final rule allowing low doses of radiation to inhibit sprouting and maturation of fresh foods and to rid foods of insects. If irradiation is to become a widespread postharvest treatment, questions about its technical effects, cost competitiveness, and acceptability to consumers, retailers, and U.S. export customers must be answered.

### Potential Applications and Limitations

Irradiation sterilizes or kills insect or microbial pests by damaging their genetic

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1/ This article is based on a paper presented at "Food Irradiation for the Produce Industry," a seminar organized by the United Fresh Fruit and Vegetable Association, Newport Beach, California, May 21-22, 1986.

Table 1.--Potential Applications and Limitations of Irradiation for Fresh Fruits

Fruits	Treatment objective	Estimated minimum dose required (krad)	Estimated maximum dose tolerated (krad)	Detrimental effects above maximum dose tolerated	Alternative treatments available
Cantaloupe, honeydew melons, persian melons, casaba melons, tomatoes	Insect disinfestation	15-30	100	Accelerated softening Abnormal ripening	Fumigation with methyl bromide (can be detrimental) Short vapor heat treatment
Apple, apricot, blueberry, cherry, fig, loquat, nectarine, peach, pear, persimmon, plum, pomegranate, raspberry, strawberry, tamarillo	Insect disinfestation	15-30 depending on the commodity	50-175	Accelerated softening Abnormal ripening	Fumigation with methyl bromide (can be detrimental) Cold treatments
	Control of postharvest diseases	150-200			Use of postharvest fungicides
Avocado, grapefruit, grape, kiwifruit, kumquat, lemon, lime, olive, orange, tangelo, tangerine	Insect disinfestation	15-30	25-75 depending on the commodity	Accelerated softening Tissue discoloration Surface pitting	Cold treatments (can be detrimental)
Banana, mango, papaya, pineapple, plantain, guava, lychee, longan, rambutan, cherimoya, carambola, passion fruit, sapodilla	Insect disinfestation	15-30	50-150 depending on the commodity	Accelerated softening Uneven ripening Tissue discoloration	Hot water or vapor heat treatments Fumigation with methyl bromide (can be detrimental)
	Retardation of ripening	25-50			Temperature management Ethylene removal Controlled atmospheres

Source: (6).

material and forming substances toxic to the organisms. Irradiation is considered a "cold treatment" that achieves its effects without raising the temperature of the product significantly. The process uses gamma rays from radioactive isotopes or machine-produced, high-energy electrons and X-rays. The energy levels of all three sources, used in accordance with restrictions imposed by FDA, will not make the food radioactive.

The effects of radiation depend on the amount absorbed, usually measured in kilorads (krad). The technical feasibility of irradiation hinges on whether the minimum dose needed to delay ripening or control fungus is below the maximum dose the fruit will tolerate before negative texture, color, and other quality problems occur. Adel A. Kader, Professor of Postharvest Physiology at the University of California-Davis, compiled minimum and maximum relationships for several fruit applications (see table 1). The doses in table 1 are averages, because even for the same type of fruit, irradiation's exact effects depend on variety, rainfall and fertilizer received, maturity at harvest, postharvest handling, and other factors.

Irradiation can be used to delay postharvest ripening in tropical fruits such as papayas and mangoes, but for other fruits, such as peaches and nectarines, irradiation accelerates ripening.

Disinfestation of fresh fruits also involves applying radiation to a living product. The amount of radiation needed to kill an insect may, in many instances, damage the fruit host. If the objective is changed to controlling insect pests by stopping development or reproduction, a dose of 5 to 75 krads would be sufficient. At the lower range of this level, some life stages of insects may survive and damage the product, and even evolve into adults. However, the adults will be sterile, or in the case of some moths, their offspring will be sterile (5)2/.

An important characteristic of irradiation is that it sterilizes or kills insects only while the food is exposed to the radiation. There are no residues to fight recontamination. Unless protective measures are taken, such as

2/ Numbers in parentheses refer to references at the end of article.

adequate packaging, the irradiated food can be reinfested.

Radiation doses of 175 to 200 krads may be used to control postharvest fungi if the fungi are more sensitive to radiation than the host commodity. Often success depends on the particular fungus, its stage of growth, and the level of infection. In many instances, the dose needed to extend shelf life causes softening and other undesirable changes in texture, appearance (mottling), or other organoleptic qualities (see table 1). In their review of irradiation studies on 27 fruits, Akamine and Moy concluded that irradiation could be used to control storage decay (without damaging the fruit) only in tomatoes, strawberries, and figs (1). Questions remain about uneven ripening and softening of tomatoes. For strawberries, the radiation treatment must be accompanied by refrigeration. For papayas, scientists have been successful in lowering the required dose from 600 to 75 krads by combining it with a hot water dip. This combination treatment might hold promise for other fruits.

High doses of radiation in the range of 2,300 to 5,700 krads, combined with heating, sterilize a food so it can be stored in sealed containers at room temperature, free from the threat of botulism for years.

Irradiation-sterilized meats have superior texture, and nutritional contents comparable to conventional canned meats. Little research has been done on high dose treatment of fruits.

#### Regulatory Approval

A 1958 amendment to the Federal Food, Drug, and Cosmetic Act specifically includes "any source of radiation" used in processing or packaging food in the definition of a food additive. Thus, fruit handlers must comply with FDA regulations prescribing safe use of radiation to treat their products, or petition FDA for new uses.

Until the spring of 1986, permission to irradiate specific foods was granted or denied in response to individual petitions submitted to FDA. In the early 1960's, FDA approved the use of radiation at doses between 20 and 50 krads to control insect infestation in wheat and wheat flour, and doses of 5 to 15 krads to inhibit sprouting of white potatoes. Neither of

these applications has ever been used, because of the availability of less-expensive and easier-to-use chemical alternatives.

On April 18, 1986, FDA issued a final rule allowing processors to use doses up to 100 krads to inhibit growth and maturation of fresh foods and to disinfest foods (*Federal Register*, Vol. 51, No. 75, p. 13399). FDA's approval of irradiation up to 100 krads would suffice to delay fruit ripening and sterilize insect pests, but would not control postharvest fungi.

For irradiation to be used as a quarantine treatment, USDA's Animal and Plant Health Inspection Service (APHIS) must be satisfied that the process prevents the introduction or spreading of plant pests from the exporting to importing country. In a 1985 report to Congress, USDA stated that research on irradiation of Hawaiian papaya to control melon fly and Mediterranean and Oriental fruit flies is sufficient to prescribe a quarantine level of a minimum of 15 krads absorbed by the insect larvae (8). As of October 1986, APHIS had not approved irradiation as a quarantine treatment. USDA researchers are investigating irradiation's suitability to control Mexican and Caribbean fruit flies in grapefruit, codling moths in apples, and fruit flies in cherries.

#### Treatment Costs and Economies of Scale

To determine irradiation's economic feasibility, one must determine its cost and compare it with the value of its benefits, as well as the cost of substitute processes. Policy makers and prospective users are interested in whether treatment costs per unit of output fall as plant size increases, a concept known as economies of scale. If the economies of scale are substantial, owners of small fruit irradiators would be at a distinct cost disadvantage when faced with direct competition from large low-cost irradiators. The scale, or size, of an irradiator is determined by the amount of product treated in an hour. Table 2 lists the irradiator sizes estimated. The dose levels and corresponding applications are described in table 3.

Since irradiators treating foods generally operate on a research scale, information from irradiators used mostly to sterilize medical supplies was adapted to estimate capital and

Table 2.--Irradiator Sizes Analyzed

Hourly capacity	Annual volume 1/
Pounds	Million pounds
2,380	12.5
4,760	25
9,520	50
19,040	100
38,080	200

1/ Based on operating three shifts a day (7 processing hours per shift) for 250 days per year.

Table 3.--Irradiation Applications Analyzed

Dose	Potential application
Krads	
10	Inhibit sprouting of root crops and elongation of asparagus
26	Insect disinfestation for quarantine purposes
75	Delay ripening
200	Control postharvest fungi

operating costs for different-sized fruit irradiators. The actual cost of irradiating a specific fruit will depend on the required dose, the fruit's tolerance of radiation, the design of the irradiator, construction costs, wage levels, financing arrangements, and other variables.

Table 4 lists investment and treatment costs for the hypothetical fruit irradiators. Costs are based on free-standing facilities to which fruits from several growers or packers are shipped. A free-standing irradiator that is not attached to a packing house would need refrigerated storage space to hold products before and after irradiation, unless trucking schedules could be coordinated with the irradiation timetable. The fruits were assumed to be irradiated in shipping boxes. Costs are for irradiators processing the hourly volumes for which they were designed and operating three shifts a day, five days per week. Other assumptions and input prices, including how capital costs were treated, are described in (7).

Treatment costs to delay ripening or disinfect fruits ranged from 3.9 cents per pound for an irradiator treating 12.5 million pounds a year, to 0.7 cents per pound for the 200-million-pound plant. At the higher dose of 200 krads needed for decay control, irradiation costs were 4.3 to 1.2 cents per pound over the same size range. For all doses, average treatment costs drop as irradiator size and the amount of product treated increase. Potential unit-cost reductions as size increases are pronounced for irradiators treating less than 30 million pounds per year, but become less important at annual capacities greater than 50 million pounds. For example, unit costs for the two largest

Table 4.--Investment and unit costs for selected cobalt-60 irradiators 1/

Dose (Krads)	Processing capacity--pounds per hour				
	2,380	4,760	9,520	19,040	38,080
10	3.9	2.1	1.3	0.9	0.7
26	3.9	2.1	1.3	0.9	0.7
75	4.0	2.2	1.5	1.1	0.9
200	4.3	2.5	1.8	1.4	1.2
Initial investment 2/--million dollars					
10	1.0	1.1	1.4	2.2	3.7
26	1.0	1.2	1.5	2.4	4.0
75	1.1	1.3	1.7	2.8	4.8
200	1.2	1.5	2.3	3.9	6.9

1/ Costs in this table are based on a specific set of assumptions and input prices listed in (7) Appendix V-A. 2/ Investment items include: cobalt-60, biological shielding and other building space, irradiator machinery and auxiliary systems, product handling equipment, refrigerated warehouse space, design and engineering, land, and working capital.

irradiators differed by only two-tenths of a cent per pound.

Firms that do not have the volumes to justify their own irradiator may have to join with others and build a centrally-located irradiator. Smaller firms could also use the services of a contract irradiator, if available, who would charge a fee for the treatment. For free-standing and contract facilities, the cost of shipping fruit to the irradiator is an added cost not included in the estimates in table 4. As free-standing irradiators increase in size, they will have to draw on larger geographic areas. Transportation costs to the larger irradiator may outweigh its gains in production economies. This may bring the total cost of using a small irradiator, with its lower transportation costs, more closely in line with a large irradiator.

#### Treatment of Seasonal Products

Irradiators are likely to operate at less than design capacity part of the year if they are used to treat seasonal products such as fruits and vegetables. Even commodities grown year round, such as papaya, have definite seasonal harvest patterns. To accommodate seasonal peaks requiring large hourly capacity, irradiators would have excess capacity during off periods. Excess capacity results in higher unit costs, because large irradiators treating small volumes would have less output over which to spread their high fixed costs.

The author looked at underutilization in an earlier analysis of treatment costs for seasonally operated strawberry irradiators (7). The short-run cost curves in figure 1 were estimated by computing costs at 25, 50, 75, and 100 percent of design capacity. If 50 million pounds of strawberries were treated in a facility designed for that annual volume, the unit cost would be close to 2 cents per pound. A plant built to handle 100 million pounds, but only treating 50 million pounds, would incur a unit cost of 3 cents per pound. If an irradiator designed for 200 million pounds treated 50 million pounds per year, unit cost would be above 5 cents per pound.

Locating an irradiator in an agricultural production area with sequential harvest times for different irradiation-compatible commodities, or irradiating non-agricultural

Figure 1.  
**Strawberries**

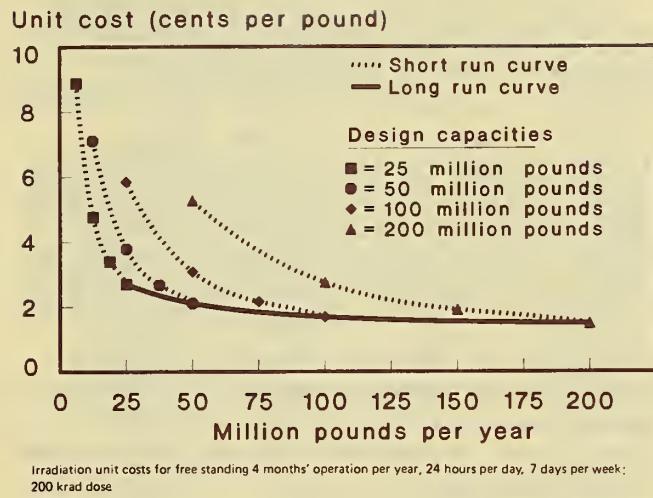


Figure 2.



items during off seasons, would lessen this underutilization problem. However, the flexibility needed to handle diverse products and doses sacrifices efficiency and increases costs.

#### Retailer and Consumer Acceptance

The commercial success or failure of irradiated fruits will rest with their acceptance by retailers and consumers. Retailers' decisions on whether to offer irradiated produce will depend on their beliefs about how consumers will react to irradiated food. In August 1985, the United Fresh Fruit and Vegetable Association conducted a survey of its members on the use of food irradiation by the fresh produce industry (2). Retailers accounted for 9 of the 53 respondents, which mostly included growers, shippers, and wholesalers. Although these retailers believed that consumer acceptance would be the major stumbling block for irradiation, 62.5 percent

said they would sell irradiated produce even if labeling were required.

FDA's April 1986 final rule requires that retail packages of irradiated foods carry the statement "Treated with radiation" or "Treated by irradiation" and the logo in figure 2 (*Federal Register*, Vol. 51, No. 75, p. 13399). For non-packaged fruits, the required logo and phrase must be prominently displayed either on the bulk container or on a nearby placard. The retail labeling requirement does not apply to foods that contain an irradiated ingredient but have not themselves been irradiated. For example, yogurt containing irradiated strawberries would not have to be labeled as containing irradiated strawberries. After 2 years, irradiated foods will be required to carry only the logo unless FDA extends the wording provision.

Because the only irradiated foods in the U.S. marketplace today are spices for ingredient use, consumer acceptance of this new process must be estimated through interviews. Over the last few years, several surveys of U.S. consumers' reactions to irradiated foods have been conducted. Generally, these surveys found that irradiation becomes more acceptable to most Americans as they learn about the technology. In a 1985 survey, U.S. consumers fell into three groups: undecided consumers (55 to 65 percent of the population) who are confused by the technology and uncertain about eating irradiated foods; acceptors, the 25 to 30 percent of the population that believe they understand the technology and generally trust its safety; and rejectors, who make up 5 to 10 percent of the population and reject food irradiation because they do not trust the safety of the process and find that it conflicts with their anti-nuclear stance and/or their preference for organic foods (3).

One way to increase acceptance of irradiated fruit may be to present the process as a substitute for chemical fumigants. In a 1985 survey by the Food Marketing Institute, 29 percent of respondents had heard of irradiation (4). When asked which method they would prefer--irradiation or chemical preservatives--39 percent of those who had heard of irradiation said they would prefer its use to chemicals, with 24 percent preferring chemicals. The remaining respondents were

not sure which method they would prefer or wanted neither treatment. Among the respondents who had not heard of irradiation, a greater portion were uncertain which technique they prefer, but more (28 percent) prefer chemical preservatives than prefer irradiation (22 percent).

### Outlook for Irradiation of Fruit

Provided retailers and consumers accept irradiated foods, how will this technology be used by the U.S. fruit industry? Insect disinfestation to satisfy quarantine requirements is one of the more promising uses of irradiation. Doses needed to sterilize insects or prevent the emergence of adults are generally not harmful to the fruit. Products requiring disinfestation are usually assembled at a port or shipping point. Consolidation early in the marketing chain avoids the additional cost of transporting fruit to an irradiator. In addition, reinfestation is not a concern because the treated product is sent to an area free from the particular pest.

Although FDA has approved the low doses needed for quarantine purposes, irradiation must be approved by the country receiving U.S. exports, too. Currently, most countries that allow food irradiation approve its use on a commodity-by-commodity basis. As of August 1985, of the 27 countries allowing irradiation of various foods, only five had approved irradiation of selected fruits for insect disinfestation (7). Other countries, such as Japan, have not accepted irradiation as a quarantine treatment.

For commercial success, irradiation must compete with alternative food treatments in terms of cost and acceptability to food safety regulators, processors, retailers, and consumers. Irradiation must offer significant quality-enhancing benefits or cost savings for a firm to abandon existing, satisfactory processes. Preliminary comparisons generally show irradiation to be more costly than chemical treatments. Chemical fumigation costs cited in the literature range from 0.3 to 2.3 cents per pound, compared with irradiation estimates of 1 to 4 cents, depending on the volume treated.

Just looking at treatment costs, however, can be misleading. Growers must also

consider the supplementary costs involved with each treatment, such as additional handling and marketing delays, damage to the fruit, or undesirable fruit quality. As the safety of chemical fumigants for workers and consumers comes under increasing scrutiny, irradiation's competitive stance may improve. At the same time, other non-chemical alternatives—cold storage, hot water treatments, and fruit-fly-free zones—may be refined.

Irradiation's use to control postharvest fungi and reduce storage losses seems less

likely. Very few fruits tolerate the 175 to 200-krad doses required, and U.S. fruit handlers are already successfully using controlled temperatures and modified atmospheres. Combining irradiation with heat treatments may be more viable because of the lower radiation dose required.

Continued research on irradiation's technical desirability, its cost competitiveness with alternative techniques, and industry and consumer acceptance of the process is needed to determine whether irradiation has a place as a postharvest treatment for U.S. fruits.

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Table 16.--Seven citrus fruits: Production, use, and value,  
United States, 1983/84-1985/86 1/

Fruit and season	Production 2/	Use of production				Value of production	
		Fresh		Processed			
		Quantity	Percentage	Quantity	Percentage		
		1,000 short tons		1,000 short tons		1,000 dollars	
			Percent		Percent		
Oranges:							
1983/84	7,246	1,869	25.8	5,377	74.2	1,304,269	
1984/85	6,734	1,888	28.0	4,846	72.0	1,459,334	
1985/86	7,512	2,124	28.3	5,388	71.7	1,074,078	
Grapefruit:							
1983/84	2,176	1,023	47.0	1,153	53.0	219,652	
1984/85	2,255	903	40.0	1,352	60.0	308,537	
1985/86	2,349	1,085	46.2	1,264	53.8	335,056	
Lemons:							
1983/84	807	439	54.4	368	45.6	125,483	
1984/85	980	446	45.5	534	54.5	168,051	
1985/86	697	436	62.6	261	37.4	218,125	
Limes:							
1983/84	63	36	57.1	27	42.9	17,506	
1984/85	72	45	62.5	27	37.5	19,901	
1985/86	64	39	60.9	25	39.1	21,017	
Tangelos:							
1983/84	162	72	44.4	90	55.6	22,796	
1984/85	162	66	40.7	96	59.3	34,354	
1985/86	133	60	45.1	73	54.9	19,012	
Tangerines:							
1983/84	208	136	65.4	72	34.6	38,917	
1984/85	139	97	69.8	42	30.2	49,432	
1985/86	149	103	69.1	46	30.9	48,313	
Templets:							
1983/84	130	34	26.2	96	73.8	21,489	
1984/85	146	28	19.2	118	80.8	26,225	
1985/86	133	41	30.8	92	69.2	15,909	
Total:							
1983/84	10,792	3,609	33.4	7,183	66.6	1,750,112	
1984/85	10,488	3,473	33.1	7,015	66.9	2,065,834	
1985/86	11,037	3,888	35.2	7,149	64.8	1,731,510	

1/ Preliminary. 2/ Production having value.

SOURCE: Citrus Fruits, NASS, USDA.

Table 17.--Selected citrus fruit: Used for processing by percentages of total production, 1978/79-1985/86

State, variety, and season	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1/
	Percent								
<b>Oranges:</b>									
Florida									
Temple	54.6	53.6	69.3	73.8	66.7	73.7	80.7	69.1	
Early and midseason	93.0	94.5	94.5	93.3	91.4	92.9	92.0	92.0	
Valencia	92.6	94.9	96.3	94.8	93.9	94.3	95.4	93.1	
Total	92.9	94.7	95.2	93.9	92.6	93.5	93.6	92.5	
California									
Navel and miscellaneous	31.3	33.4	37.0	20.0	32.3	24.8	11.8	19.5	
Valencia	36.4	33.7	50.2	20.8	55.3	17.6	34.0	20.9	
Total	33.5	33.5	42.3	20.3	43.2	22.6	22.9	20.1	
<b>Grapefruit:</b>									
Florida									
Seedless	53.8	58.6	60.2	60.3	47.1	54.2	63.5	55.0	
Colored	28.3	33.6	39.0	43.3	27.6	32.7	40.9	28.4	
White	65.4	71.4	71.1	69.5	58.5	66.8	78.4	73.7	
Other seeded	99.0	98.7	99.1	100.0	100.0	100.0	100.0	100.0	
Total	60.4	64.4	65.9	65.2	53.5	59.3	65.9	58.0	
Texas	55.6	46.8	30.6	48.0	30.4	10.6	0	9.1	
<b>Tangerines:</b>									
Florida	46.0	40.0	36.5	36.4	33.8	29.8	34.0	35.8	
California	34.5	52.4	59.1	35.3	47.0	50.3	31.8	29.4	
<b>Lemons:</b>									
California	35.0	48.5	62.3	56.9	54.4	46.4	52.8	37.1	
Arizona	49.1	48.0	68.0	59.0	52.9	42.0	60.2	39.1	

1/ Preliminary.

SOURCE: Citrus Fruits, NASS, USDA.

Table 18.--Oranges used for frozen concentrate, Florida, 1983/84-1986/87

Season	Florida orange and Temple production	Used for frozen concentrates 1/		Yield per box 2/
		Million boxes	Percent	
1983/84	119.6	94.5	78.6	1.29
1984/85	107.2	86.1	80.3	1.38
1985/86	122.0	96.1	78.8	1.38
1986/87	132.6	NA	NA	1.44

1/ Includes tangelos, Temples, tangerines, and K-early citrus. 2/ Gallons per box at 42.0 degrees Brix equivalent. NA = not available.

SOURCES: Crop Production and Citrus Fruits, NASS, USDA, and Florida Citrus Processors Association.

Table 19.—Citrus fruit: Season-average equivalent returns per box received by growers, by variety and use, by State and total United States, 1984/85–1985/86

Variety, States, and U.S.	1984/85						1985/86					
	Equivalent P.H.D. 1/			Equivalent on-tree			Equivalent P.H.D. 1/			Equivalent on-tree		
	All	Fresh	Proc.	All	Fresh	Proc.	All	Fresh	Proc.	All	Fresh	Proc.
Dollars												
<b>ORANGES:</b>												
Florida												
Early and midseason	9.15	13.70	8.75	7.30	11.85	6.90	5.77	8.40	5.54	3.77	6.40	3.54
Valencia	8.73	11.50	8.60	6.88	9.65	6.75	5.85	5.90	5.85	3.85	3.90	3.85
All	8.95	12.96	8.68	7.10	11.11	6.83	5.81	7.34	5.68	3.81	5.34	3.68
Temple	8.07	12.30	7.06	5.59	9.90	4.56	5.39	8.30	4.09	2.92	5.90	1.59
California												
Navel and misc.	11.36	12.54	2.56	9.76	10.94	.96	7.22	8.90	.28	5.56	7.24	-1.38
Valencia	7.95	10.48	3.04	6.23	8.76	1.32	5.75	7.10	.64	3.95	5.30	-1.16
All	9.66	11.66	2.92	8.00	10.01	1.23	6.64	8.20	.43	4.93	6.49	-1.29
U.S. 2/	9.19	11.82	8.02	7.41	10.14	6.19	6.09	8.08	5.19	4.18	6.32	3.22
<b>GRAPEFRUIT:</b>												
Florida												
Seedless	5.28	7.12	4.22	3.74	5.62	2.67	5.66	6.79	4.73	4.03	5.19	3.08
Seeded	4.08	(3)	4.08	2.58	(3)	2.58	4.77	(3)	4.77	3.17	(3)	3.17
All	5.20	7.12	4.20	3.67	5.62	2.66	5.60	6.79	4.74	3.97	5.19	3.09
Texas	(4)	(4)	(4)	(4)	(4)	(4)	9.44	9.93	4.48	8.44	8.93	3.53
California	7.15	9.70	1.07	5.63	8.18	-.44	7.10	9.75	.85	5.69	8.35	-.58
Arizona	5.65	8.10	1.09	4.18	6.64	-.38	4.88	7.14	.82	3.40	5.66	-.66
U.S.	5.53	7.89	3.85	4.01	6.39	2.31	5.80	7.47	4.31	4.21	5.92	2.69
<b>LEMONS:</b>												
California	7.10	13.24	1.60	4.44	10.58	-1.06	11.23	17.18	1.14	8.57	14.52	-1.52
Arizona	4.59	9.80	1.14	1.54	6.74	-1.91	14.93	23.60	1.42	12.19	20.85	-1.32
U.S.	6.51	12.54	1.48	3.76	9.80	-1.28	11.89	18.29	1.19	9.21	15.61	-1.48
<b>TANGERINES:</b>												
Florida	18.78	24.85	7.01	15.91	22.15	3.81	15.99	22.40	4.51	12.81	19.40	1.01
California	12.51	17.15	2.58	9.91	14.55	-.02	11.99	17.05	-.13	9.39	14.45	-2.73
Arizona	12.42	14.66	2.58	9.81	12.05	-.02	11.91	15.45	.88	9.31	12.85	-1.72
U.S.	14.41	18.78	4.13	11.73	16.15	1.32	13.24	18.27	1.74	10.45	15.56	-1.19
<b>TANGELOS:</b>												
Florida	9.54	12.80	7.30	7.08	10.40	4.80	6.44	8.80	4.49	4.02	6.40	2.04
<b>LIMES:</b>												
Florida	12.13	17.40	3.36	7.27	12.20	-.94	14.49	21.70	3.37	9.65	16.50	-.93

1/ P.H.D.—Packinghouse-door. 2/ Excludes Temples. 3/ Fresh sales insignificant. 4/ No price data for 1984/85 due to frost damage.

SOURCE: Agricultural Prices, NASS, USDA.

Table 20.--Frozen concentrated citrus juices: Canners' stocks, packs, imports, supplies, and movement, Florida, 1983/84-1985/86 season

Item and season	Carryin	Pack		Imports and other supplies 1/		Supply		Movement		Stocks 2/		
		To date 2/	Total season	To date 2/	Total season	To date 2/	Total season	To date 2/	Total season			
1,000 gallons 3/												
<b>Oranges:</b>												
1983/84	42,824	121,216	121,216	93,064	118,690	257,104	282,730	198,709	228,310	58,395		
1984/85	54,420	118,472	118,472	79,900	91,082	252,792	263,974	185,275	215,746	67,517		
1985/86	48,228	132,406		65,170		245,804		193,815		51,989		
<b>Grapefruit:</b>												
1983/84	5,449	19,291	19,291	745	951	25,485	25,691	18,628	21,655	6,857		
1984/85	4,036	24,802	24,802	290	512	29,128	29,350	22,979	25,963	6,149		
1985/86	3,387	24,162		1,687		29,236		22,821		6,415		
<b>Tangerine:</b>												
1983/84	116	636	636	251	251	1,003	1,003	666	699	337		
1984/85	304	285	285	470	512	1,059	1,101	456	507	603		
1985/86	594	368		599		1,561		1,173		388		

1/ Includes domestic receipts of non-Florida product; receipts of Florida product from non-members; reprocessed frozen concentrated tangerine juice; product received in fulfillment of futures contracts; chilled orange juice used for FCOJ; net loss or gain during reprocessing. 2/ For the 1985/86 season, week ending October 11; 1984/85 October 12 and 1983/84 October 13. These respective dates include data through the 45th week of each season. 3/ Orange and tangerine, 42.0 Brix; grapefruit, 40 Brixes.

SOURCE: Florida Citrus Processors Association.

Table 21.--Canned citrus juices 1/: Canners' stocks, packs, supplies, and movement, Florida, 1983/84-1985/86 season

Item and season 2/	Beginning stocks	Pack	Total supply	Season movement	Ending stocks
1,000 cases, 24 No. 2's					
<b>Orange: 3/</b>					
1983/84	1,414	9,084	10,498	9,311	1,187
1984/85	1,187	7,425	8,612	7,723	889
1985/86	889	7,596	8,485	7,499	986
<b>Grapefruit: 3/</b>					
1983/84	2,421	9,513	11,934	10,231	1,703
1984/85	1,703	10,552	12,255	10,968	1,287
1985/86	1,287	9,948	11,235	9,721	1,514
<b>Blend:</b>					
1983/84	150	555	705	606	99
1984/85	99	615	714	579	135
1985/86	135	577	712	587	125

1/ Single-strength. 2/ Season beginning approximately October 1. 3/ Includes reconstituted juices.

SOURCE: Florida Citrus Processors Association.

Table 22.—Producer price indexes of selected dried and frozen items,  
by months, United States, 1983-86

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1967=100												
<b>Dried fruit:</b>												
Prunes	NA	281.7	281.7	281.7	NA	281.7	NA	281.7	NA	281.7	NA	281.7
1983	281.7	281.7	284.1	284.1	284.1	284.1	284.1	284.1	288.0	292.7	292.7	292.7
1984	292.7	283.2	283.2	283.2	290.1	290.1	290.1	290.1	280.6	286.4	NA	286.4
1985	286.4	286.4	286.4	286.4	286.4	286.4	NA	286.4	286.4			
Raisins	NA	450.6	449.8	449.7	NA	450.6	NA	449.8	NA	429.2	NA	428.5
1983	425.2	425.7	423.6	423.6	411.5	411.5	411.5	306.7	307.5	316.2	321.1	321.1
1984	313.9	314.1	314.1	NA	321.7	NA	NA	NA	NA	350.3	NA	350.3
1985	341.5	341.5	350.4	345.8	345.8	NA	NA	NA	373.0			
Frozen juice:												
Orange, conc.												
1983	304.0	300.8	299.6	299.1	302.3	300.7	301.0	300.8	302.4	302.5	303.8	303.8
1984	316.4	361.6	373.3	380.3	385.2	395.0	386.7	392.4	403.7	410.2	408.3	407.8
1985	400.8	419.1	419.4	418.3	420.2	416.9	410.7	396.7	390.1	375.7	365.6	355.1
1986	328.5	324.6	307.2	297.0	296.3	300.7	300.5	296.5	295.4			

NA = not available.

SOURCE: Bureau of Labor Statistics, U.S. Department of Labor.

Table 23.—Monthly average price indexes for fruits, United States, September 1985-86

Item	1985						1986				
	Sept.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	
(1967=100)											
Producer price index:											
Fresh fruit	249.6	248.0	250.8	242.5	248.1	270.9	265.3	284.6	244.6	238.3	
Citrus fruit	283.0	204.7	199.2	208.4	212.4	223.8	228.4	268.0	237.8	147.0	
Other fruit	232.3	265.6	272.0	255.5	261.8	290.0	279.5	288.1	244.1	280.3	
Dried fruit	369.1	371.1	369.3	372.9	371.1	371.6	373.6	371.3	387.4	383.7	
Canned fruit and juice	324.3	314.6	313.3	315.5	314.5	315.2	315.9	316.0	317.4	311.9	
Canned fruit	277.5	274.1	272.7	276.3	274.6	275.9	277.1	277.0	278.9	268.8	
Canned fruit juice	398.3	378.6	377.5	377.5	377.4	377.4	377.1	377.7	378.2	379.8	
Frozen fruit and juice	358.9	323.7	321.5	312.2	308.9	308.7	311.2	312.1	311.0	310.5	
Consumer price index:											
Fresh fruit	368.5	350.8	353.3	352.0	367.9	385.5	372.4	382.2	391.5	384.1	
(1977=100)											
Index of fruit prices received by growers 1/	182	160	154	150	146	157	177	164	179	174	

1/ Index for fresh and processed.

SOURCES: Bureau of Labor Statistics, U.S. Department of Labor, and Agricultural Prices, NASS, USDA.

Table 24.--Monthly average fruit prices received by growers, United States, September 1985-86

Commodity and unit	1985		1986								
	Sept.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	
Apples for fresh use (cts./lb.)	17.7	17.0	17.9	18.4	17.3	21.1	24.2	25.4	26.8	22.3	
Pears for fresh use (\$/ton)	277.00	348.00	350.00	417.00	440.00	604.00	838.00	280.00	341.00	341.00	
Peaches for fresh use (cts./lb.)	22.9	---	---	---	---	26.1	19.2	23.2	17.1	25.2	
Strawberries for fresh use (cts./lb.)	58.3	93.3	84.9	62.1	50.9	43.0	53.8	53.7	83.7	85.5	
Oranges: (\$/box) 1/											
Fresh use	8.16	7.29	6.08	6.14	5.36	5.51	5.30	5.08	5.40	5.90	
Processing	1.32	3.63	3.04	2.14	3.25	3.85	3.80	-1.15	-1.16	-1.16	
All	5.78	4.27	3.71	3.85	3.79	4.19	4.27	3.63	4.03	4.34	
Grapefruit: (\$/box) 1/											
Fresh use	8.73	4.90	5.13	5.46	5.66	7.40	9.16	8.48	8.58	8.58	
Processing	-.50	2.87	3.07	3.19	2.76	.49	-.54	-.53	-.52	-.52	
All	7.58	3.78	3.76	3.94	4.22	5.20	5.98	6.17	6.76	6.63	
Lemons: (\$/box) 1/											
Fresh use	36.81	11.93	8.48	7.91	8.77	8.35	13.05	14.52	14.48	6.76	
Processing	-1.48	-1.50	-1.50	-1.53	-1.52	-1.52	-1.52	-1.52	-1.00	-1.57	
All	23.62	6.58	4.39	4.06	4.47	4.53	7.81	8.96	8.37	2.60	
Tangerines: (\$/box) 1/											
Fresh use	24.37	14.46	16.15	9.91	9.98	11.62	2.15	---	---	---	
Processing	.50	-.99	-2.60	-2.63	-2.72	-2.73	-2.73	---	---	---	
All	17.62	10.19	10.14	6.02	5.86	5.80	.52	---	---	---	

1/ Equivalent on-tree returns.

SOURCE: Agricultural Prices, NASS, USDA.

Table 25.--Fresh fruit: Retail price, marketing margin, and grower--packer return, per pound, sold in Baltimore, season average, 1983/84-1985/86

Commodity, production area, and season 2/	Retail price	Marketing margin		Grower--packer return (f.o.b. shipping point price) 1/	
		Absolute	Percent of retail price	Absolute	Percent of retail price
		Cents	Percent	Cents	Percent
Apples, Eastern Delicious: Appalachia: (lb.) 3/					
1983/84	36.8	22.3	58	16.3	42
1984/85	40.0	16.4	41	23.6	59
1985/86	37.8	12.7	34	25.1	66
Apples, Red Delicious, Washington State: (lb.)					
1983/84	68.2	39.7	58	28.5	42
1984/85	68.4	32.8	48	35.6	52
1985/86	73.8	36.9	50	36.9	50
Grapefruit, Florida: (lb.)					
1983/84	26.4	17.2	65	9.2	35
1984/85	31.0	19.8	64	11.2	36
1985/86	30.8	18.7	61	12.1	39
Lemons, California: (lb.)					
1983/84	80.5	53.8	67	26.7	33
1984/85	82.5	52.3	63	30.2	37
1985/86	102.1	68.7	67	33.4	33
Oranges, Navel, California: (lb.)					
1983/84	40.4	23.9	59	16.5	41
1984/85	46.2	21.6	47	24.6	53
1985/86	45.3	26.3	58	19.0	42
Oranges, Valencia, California: (lb.)					
1983	36.9	23.4	63	13.5	37
1984	45.9	20.2	44	25.7	56
1985	52.0	32.3	62	19.7	38
Oranges, Florida: (lb.)					
1983/84	35.6	20.4	57	15.2	43
1984/85	46.6	28.0	60	18.6	40
1985/86	40.1	28.3	71	11.8	29

1/ Adjusted to account for loss incurred during marketing due to waste and spoilage. 2/ Season: Eastern Delicious Apples - (Oct.-May), Washington Delicious Apples - (Oct.-June), Grapefruit (Nov.-Apr.), Lemons - (Aug.-July), Navel Oranges (Dec.-May), Valencia Oranges (May-Nov.), Florida Oranges (Nov.-May).

3/ The Eastern Delicious apple production figures are for January, February, and March 1984 in New York.

SOURCES: Maryland State Dept. of Agriculture, Baltimore Retail Food Price Report; U. S. Dept. of Agriculture, Agricultural Marketing Service; and the Lemon, Navel Orange, and Valencia Orange Administration Committees.

Table 26.--Exports of selected dried fruits and tree nuts by destination,  
United States, 1983/84-1985/86

Item and season 1/	Canada	Europe				Japan	Other	World
		West Germany	Other EC 2/	Other	Total			
Metric tons								
Prunes:								
1983/84	2,764	5,303	18,317	10,926	34,546	9,537	5,877	52,724
1984/85	2,255	4,713	16,406	6,618	27,737	8,558	8,296	46,846
1985/86	2,713	6,270	19,154	6,645	32,069	7,022	6,446	48,250
Raisins:								
1983/84	4,283	2,899	9,163	7,705	19,767	14,095	11,950	50,095
1984/85	3,237	4,158	13,437	7,577	25,172	17,270	13,744	59,423
1985/86	3,472	5,019	19,529	9,306	33,854	20,736	13,811	71,873
Shelled almonds:								
1983/84	3,092	12,086	13,153	6,946	32,185	12,278	10,273	57,828
1984/85	2,740	25,231	20,321	9,173	54,725	12,439	37,404	107,308
1985/86	2,581	37,843	30,589	10,575	79,007	15,322	39,402	136,312

1/ Season beginning August 1, for prunes and raisins, and July 1 for almonds. 2/ Belgium-Luxembourg, France, United Kingdom, Italy, Netherlands, Denmark, Ireland, Greece, Spain, and Portugal.

SOURCE: Foreign Agricultural Service, USDA.

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